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THE COLOR COMPUTER MONTHLY MAGAZINE

December 1990 Vol. X No. 5

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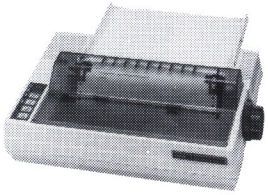

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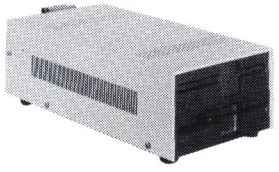

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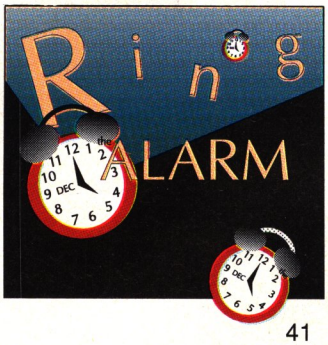
Table of Contents

December 1990
Vol. X No. 5

Features

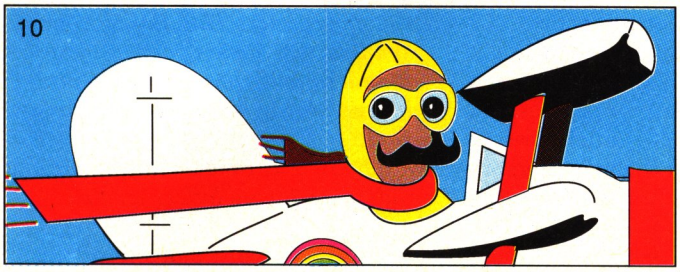
10
CoCo Home Video Companion
Mark Haverstock and Bill Wills
Let the CoCo 3 create titles, credits and graphics for your home videos

34
Displaying Pictures Using OS-9 Level II Graphics, Part III
Tim Kientzle
Another look at data-compression techniques



41

41
Alarm
David P. Boynton
A look at sounding the alarm under OS-9



Product Reviews

In the Limelight
Rascan 2.4/*Supersoft, Inc.* ____ **83**

Cassette #93/*T&D Subscription Software* ____ **74**
CIII Lettrex/*Coless Computer Design* ____ **77**
CIII Pages Enhanced/*Coless Computer Design* ____ **78**
Connecting the CoCo to the Real World/*William Barden, Jr.* ____ **80**
The Entity/*Biware Enterprises* ____ **76**
The Goldberg Utilities/*Kenneth-Leigh Enterprises* ____ **74**
Planet Engine Version 1.1/*Gravity Studio* ____ **79**

46
Better Letters
Joel Mathew Hegberg
Word play on the CoCo 3

62
CoCo TV
Andrew T. Boudreaux
Start your own TV series with a little help from a friend

Novices Niche

20
Wormy
Dan Tandberg, M.D.

50
Huck Bucks
Sharon Ling

57
Hot Gold
Keiran Kenny

73
Angles on the CoCo
Keiran Kenny

Departments

Advertisers Index ____ 95
Back Issue Info ____ 60
Corrections ____ 42
Letters to Rainbow ____ 4
Received & Certified 82
Submitting Material ____ 88
Subscription Infor ____ 38

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Columns

54
Barden's Buffer
William Barden, Jr.
Contest results

87
BreakPoint
Greg Law
'tis the C zen

68
CoCo Consultations
Marty Goodman
GIME ghostbusters

58
Delphi Bureau
Eddie Kuns
The Delphi mailman

The cassette tape/disk symbols beside features and columns indicate that the program listings with those articles are on this month's RAINBOW ON TAPE and RAINBOW ON DISK. Those with only the disk symbol are not available on RAINBOW ON TAPE. For details, check the RAINBOW ON TAPE and RAINBOW ON DISK ad on page 72.

21
KISSable OS-9
Dale Puckett
Legends of the C

8
Print#-2
Lonnie Falk
Editor's notes

52
Turn of the Screw
Tony DiStefano
EPROM programmer handbook

28
Wishing Well
Fred Scerbo
The tour continues

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Contributing Editors
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Letters to the RAINBOW

Having a Ball in Florida

Editor:

I recently sent in for a subsription to THE RAINBOW, and I want you to know the reason. I walked into my local Radio Shack store to purchase a set of joysticks for my CoCo 2. As I wrote my check, the store mananger handed me the September issue of THE RAINBOW and told me to have a ball. It was my first meeting with THE RAINBOW, and I did have a ball. I went home and sat right down and entered *Color Ball*. I am a 55-year-old kid at heart and the games fascinate me. I sent for the two most recent game issues and I am literally having a ball.

Thank you. I found my pot-o-gold.

Ray Atwood
Naranja, Florida

Support for the Community

Editor:

With regards to Jim Price's criticism of your OS-9 articles in the September issue, I think his suggestion that you ignore OS-9 is ludicrous. OS-9 is a major part of the CoCo Community and without it the CoCo, and THE RAINBOW itself, might have died long ago. We should not have to purchase another magazine for OS-9 articles, as he suggests, when OS-9 is such an important part of the CoCo. Moreover, his suggestion ignores the financial contribution OS-9 vendors make to THE RAINBOW through advertisements.

The reduction in size of THE RAINBOW is due not to OS-9 as he implies but to decreased revenue from advertisers. This is caused in part by people like Mr. Price who do not buy THE RAINBOW and do not support it or its advertisers.

If Mr. Price wants "good useable material," I suggest he support THE RAINBOW, as well as its advertisers, and try OS-9. Once he sees the power of OS-9 he may develop an interest in it just as I did.

Bruce Arsenault
Cleveland, Nova Scotia
Canada

The Educated CoCo

Editor:

I am a gullible 63-year-old woman, but I don't believe what just happened on my CoCo 3. I was using your hint in the January 1987 issue (Page 148) to make print-outs of disk directories. I got tired of all the typing required for each disk, so I typed: `10 POKE 111, 254:DIR` and then used `RUN`.

By mistake, I used it on a DOS disk and got some lines of garbage. When I used it on my next disk, the directory listings were underlined. This was even better and easier to read, but I couldn't figure out what had happened. Being nosy, I listed my original line 10 and this is what I saw;

```
10 POKE 111,254:DIR
20 FOR N=&H16128 to &H20480
```

Where did Line 20 come from and what does it mean? Is my beloved CoCo 3 taking over the tedious job of programming to save my arthritic fingers? Do you think it might eventually write a program for winning the Florida State Lottery? Please explain.

Mrs. Dorothy Topping
3400 S.W. Dunklin Avenue
Okeechobee, FL 34974

To avoid a lot of technical jargon, the gobbledegook on the DOS disk dinged the BASIC interpreter. This flaked your program and sent some codes to the printer telling it to underline. (You can probably duplicate this by sending the codes yourself.) It isn't a miracle cure for arthritis, but we suppose this random happening could *result in a winning lottery number.*

Powerful Connections

Editor:

Is it possible to modify a CoCo 3 for use with the British 240-volt, 50-Hz power supply and 625-line PAL TV standard using the RF modulator and transformer from a CoCo 2 sold in Britain? If so, how would I do this? Are there any companies that would make the modification for me?

P.R. Marlow
50 Lime Avenue
Bentley, Walsall
West Midlands, G.B. WS2 0JP

For information on using the CoCo overseas, refer to "CoCoing Abroad" (November 1987, Page 32) by Marty Goodman and Don Hutchison.

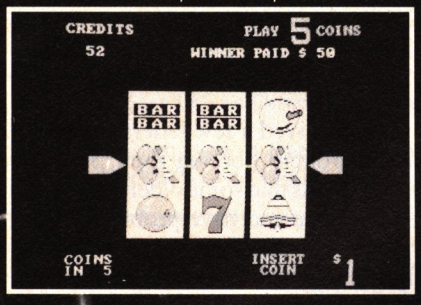
The CoCo Supports Him

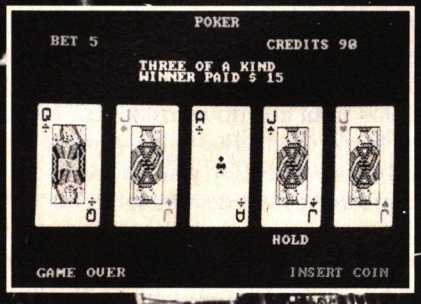
Editor:

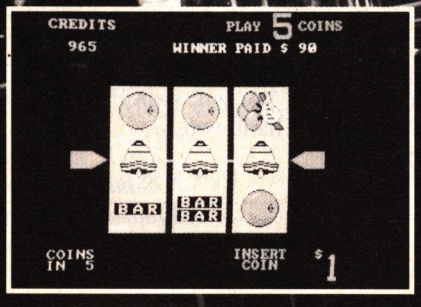
I'm a handicapped technician and I can't justify the expense of expanding my Tandy HX. In fact, my printer stays pretty much switched to my CoCo. My present employer runs a Unix system, as did my last

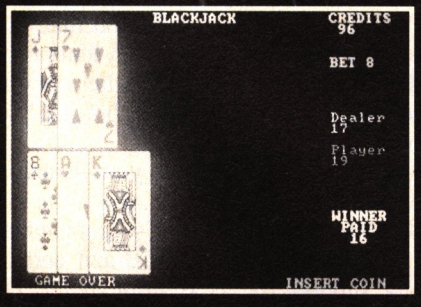
Slots & Cards

VGA Graphics Depicted









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three employers. Maybe I can soon afford OS-9 and learn more Unix-type skills.

I love this 512K CoCo 3 system. I bought *CoCo Max 3*, *Max 10*, *Color Graphics Designer Plus* and *Simply Better*. I use them daily, along with several RAINBOW programs that I've modified. I keep an 800-item wordbase inventory under *Simply Better* that is more flexible and much faster for my uses than *dBASE* or Unix.

I'd rather put my dollars in this CoCo. I've got a family, bills and little time for fooling around. I wish Radio Shack treated me a little better for the money I've spent. And I wish IBM vendors were as good as the CoCo's. I think what some clerks call "their kid's computer," in addition to my subscription to THE RAINBOW, gives me the biggest bang for the buck on this planet.

Michael Cormier
Ft. Myers, Florida

Upgrading the CoCo

Editor:

I want to buy a disk drive for my CoCo 3 and to upgrade the memory to 512K (it now has 128K). At present I use a tape recorder to store my programs. I want to order my disk drive out of THE RAINBOW. I really enjoy reading THE RAINBOW and want to order RAINBOW ON DISK. What is the size of the disk?

Could you tell me what is compatible with my CoCo 3 in the line of a disk drive and upgrade kits.

Bennie Luttrell
314 Bird Circle
Greeneville, TN 37743

RAINBOW ON DISK is produced on 5 1/4-inch floppies. Several advertisers in THE RAINBOW offer 5 1/4-inch, Drive 0 systems. Just compare the prices. Similarly, the 512K upgrade is fairly standard from advertiser to advertiser. For specifics on upgrades, see "Upgrading the Color Computer's Memory" by Marty Goodman in the March 1989 issue.

The Great MPI Hunt

Editor:

Radio Shack in Fort Worth suggested you might be able to help me locate a Multi-Pak Interface (Cat. #26-3124). I understand it is needed to operate my old disk drive with a new CoCo 3.

I would appreciate having a list of your vendors that could help me in such a search. Thanks.

Robert Heyl
8983 Eastview Drive
Allison Park, PA 15101

Yes, the MPI is a difficult animal to locate. Check with Computer Plus to see if they can help you out. Or perhaps another reader can solve the problem for you.

Looking to Ham it Up

Editor:

I am in desperate need of locating software for the CoCo to manage my ham shack. I had a CoCo 1 that I used for RTTY about five years ago. In the last four years I put hamming and computing aside to pursue my trade as an ironworker. I recently became active again with both hobbies.

After much debate with and ridicule from other hams, I decided to buy the CoCo 3 rather than an IBM. For some unknown reason I wanted to support the CoCo. I now have a CoCo 3 (512K), two floppy drives and OS-9, but I have very little software for the ham radio. I need to locate more ham software and would like to interface my Kenwood 440 transciever to my CoCo. I feel I've done my part to support the CoCo. Now will the world of CoCo please help to support me? Any information on this matter would be appreciated. Perhaps you could help me locate Steven Ford and any other ham-CoCo enthusiasts.

Dean Maluski
27 William Street
New Britain, CT 06051

As published in the February 1990 issue, Steven Ford can be contacted at 12 Foxbridge Village Road, Branford, CT 06405. Another source of ham information is Dale Puckett, author of "KISSable OS-9."

Protecting Protection

Editor:

I read about the Reset protection routine in the July 1990 issue of THE RAINBOW and at the time thought 'I won't need that.'

Of course now I need to use Reset protection. I also need a Break/Escape protection routine as well as the ability to restore all of these functions without turning off my CoCo 3. I am developing a password protection scheme, but it only protects one program. I would like to modify this so that my password will protect an entire disk from unauthorized access. Any helpful hints and advice will be welcome.

Joan Claso
2480 Lazy Landing Drive
Redding, CA 96002

68000s Unite!

Editor:

I recently attended a computer fair at Purdue University where I gathered information about Amiga, Macintosh and MS-DOS-based systems. When I looked through the information about the Amiga and Macintosh systems, I noticed these systems use the 68000 and 68030 CPUs, similar to the new 68K OS-9 systems offered in THE RAINBOW. I wonder if these systems have any similarities and, if so, is there any compatibility between them. I want to purchase a new system, but fear I might be leaving the CoCo family. Is there any hope?

Kevin Bump
741 San Ricardo Drive
Greenwood, IN 46142

There are myriad hardware differences between the Macintosh, the Amiga and the computers on our horizon. Still, OS-9 provides a good foundation for compatibility, and OSK (OS-9 for the 68000 series) is available for all these machines.

SoundTrax Update

Editor:

I've received a few letters from people having trouble booting their *SoundTrax* disk. It seems that some older drives tend to be unreliable and have problems with the *SoundTrax* loader. For this reason we have slightly reprogrammed the loader to be a little more understanding of these drives. While we were modifying the loader, we decided to make a few other suggested changes. First, the program can now be booted from any drive instead of the normal hard-coded Drive 0. It also recognizes double-sided drives so you can access drives 2 and 3 as the flip sides of 0 and 1. For those who have purchased *SoundTrax* either through us or a dealer and have the aforementioned booting difficulties, or simply want to upgrade to Version 1.01 with the minor additions, please send the original disk along with your receipt and $5 to cover time and S/H. We will rush the upgraded disk to you. Thank you.

Glen R. Dahlgren
Sundog Systems
Manassas, Virginia

Kudos

Editor:

It may be of interest to you that, as a result of your publication of my letter in the May issue I have received replies not only from some American readers, but also from Brazil and Australia.

Here is a quote from your Brazilian reader:

"Unfortunately, the CoCo (compatibles) was discontinued here in Brazil and the only support for us is through the THE RAINBOW. At my work I use many programs that appear in this magazine and the results that I obtain have stimulated me very much!"

After that he gives a list of various

Continued on Page 94

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Vol 1: 15 Power-packed utilities such as sort, lost-file location, disk pack & more. **$24.95**

Vol 2: New utilities for OS9 such as file compare,protection, enhanced delete/ move/ dir/ sort/ dump, strip and much more. Only **$24.95**

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In-memory disk drive! A must for every OS9 user. Req 512K. Disk Only **$29.95**

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Warp One: Level II Windowing Terminal. Req. 512K & RS232 Pack. **$34.95**

Zapper: Patch disk errors. $19.95

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Presto Partner: Notepad, calculator, calendar, phonebook, clock at your fingertips. Req. 512K. **$29.95**

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PC-Xfer Utilities: Format/ transfer files to/from MSDOS to CoCo under Level 1/2. Req SDISK/SDISK 3. Only **$44.95**

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SDISK: $29.95

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Menuing Utility: Memory resident menuing system. Only **$19.95**

Point-and-Shoot File Selection: $19.95

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Dynastar: Popular OS9 word processor. Only **$99.95**

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Unto What Far Harbor?

Just a few minutes ago I finished reading Allen Drury's new novel *Toward What Bright Glory?*, the first in a series of novels expected to follow a group of college students from the year just before World War II to the present day. Drury is excellent at writing series novels, and his first work in this series holds much promise.

I hope when I write my long-planned novel I can create as thought-provoking a title as this former Pulitzer Prize winner (for *Advise and Consent*) has here. This book's title and the book itself, including the final paragraphs from which the title comes, have universal appeal. Even though Drury writes about the issues of war and peace, the shaping of lives, the maturing of people and of nations, his title is one that can apply to almost any human endeavor.

As I finished reading the final page and reluctantly closed the book (already wishing for the second one), I thought about our own CoCo Community. In this book the class of '39, merely three months from the bosom of their university, came face-to-face with what Mr. Drury terms "the hounds of hell" unleashed on the world by the fanatic Nazi Germany. We, in the CoCo Community, are also sometimes beset by trials of our own. While our issues may not be as world-shattering as those in Drury's book, they are nonetheless important to those affected. And even though we are not under siege from a foreign power, my mail indicates a perception that our Community's way of life is no less threatened. I do not see this threat.

We are the possessors of an amazingly sophisticated computer system. We are embraced by a caring and interested Community. There are new options on the horizon with more powerful machines that will allow us to "Keep on CoCo-ing." And a growing number of small developers who need our encouragement. Ours is an ancient (as computers go) and proud heritage on which we can only improve.

Toward what bright glory do we aspire? To use our CoCos, to pass them on to others and to share our information and knowledge. All of these are possible for each of us. And for our CoCo Community as well.

I must address some of the concerns expressed recently in my mail. I realize mail is not necessarily an accurate reflection of a total Community, but often those who voice their concerns speak for many others who are no less concerned but choose to remain silent. So, for concerned parties of both groups...

There is no intention, plan, idea, concept or anything of the kind to cease publication of THE RAINBOW. I don't know how these rumors get started. I've heard them for a decade. Yes, we depend on advertising revenue for the vast majority of our income and if advertising drops, so will the number of our pages. But if advertising revenues increase, our number of pages will also increase.

There are a number of ways in which you can help. One way is to support our advertisers. Even if you are not familiar with their product, try something new. Another way you can help is to subscribe to THE RAINBOW. It is very expensive to make our magazine available for single-copy sales. We are curtailing sales locations because there is actually a loss taken on every magazine sold. It is also less expensive to receive the magazine through subscription than to pay for each individual copy.

Many of you in the CoCo Community have been, and will continue to be, with us for a long time. One of the greatest mistakes made by the old *80 Micro* magazine was to abandon its Model I and Model III readers. There are no such plans for the CoCo Community.

We cancelled our plans to publish the CoCo history book because the authors said that given their time constraints they would be unable to deliver it. We want to publish that book. We tried to find someone who would write it for us. And when there was no other answer we refunded the money to those with pre-paid orders. We would still publish the book if an author is found. If you want to write it, please give me a call.

We absolutely plan to have RAINBOWfest in Chicago this spring. We have tried to encourage plans for one or two smaller fests this fall. These smaller fests will probably not be as successful as RAINBOWfest and participants should not be discouraged if they are not. We put a lot of punch behind our show. And, at least at this time, we feel it is better to have one big show per year than two.

We have every intention to continue our support of both Disk BASIC and OS-9. We believe both systems offer many educational opportunities. We will leave it up to you to choose whether or not to learn OS-9.

You should understand that as a matter of policy (my personal policy) we will not support any other publication aimed at the CoCo Community. This is not a decision based on competition, it is a decision based on the difficulty of producing a magazine/newsletter publication. Over the years there have been perhaps a dozen such publications. They have all gone out of business and left a bad taste in the mouths of many people. Some of the competition has been very large and well-funded. And some of them closed their doors at the very height of CoCo sales. Each closing hurt our Community. I decided many years ago to never allow that to happen again.

I am personally optimistic about the Color Computer and the CoCo Community. There are things that can be done on a CoCo today that could not be done on a mainframe when the CoCo was introduced. To have that much user-friendliness, power and potential means your CoCo will be useful for many years to come.

And we intend to be part of that with you. Onward toward an even brighter glory!

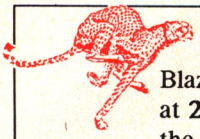
— Lonnie Falk

...Just think of any word processing feature, chances are Word Power has it...packs a lot of features...excellent word processor..." **Word Proc. Comparison**-April 1989 Rainbow; Pg 26.

Word Power 3.3

The Best Just Got Better!

"...friendly...amazing execution speed...much easier to use than VIP software & 2 other systems I've tried...very user friendly...highest among word-processors"-Rainbow Oct 88 Rev.



SPEED

Blazing Fast! Runs at **2 Mhz** and uses the standard text screens for lightning fast execu-

MEMORY

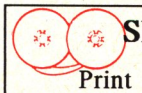
Word Power 3.3 allows **72K** of workspace on a 128K CoCo and **460K** on a 512K CoCo. More memory than any other word processor. Period.

DISPLAY

Choice of **40** or **80** columns with your choice of colors. Can be used with RGB/ Composite/Mono-chrome Monitors and TV. Pull down menus, plain english prompts, on-screen underlining and page break display make

EDITING

Powerful full-screen editor w/ word-wrap. 4-way cursor,scrol-ling; Line Positioning; Block Commands; Search, Replace; OOPs recall during delete, adjustable key-repeat, key-click, typeahead, Tabs, Word-Count and much more! . Built-in extensive **HELP** screen can be accessed anytime during edit.



SPOOLER

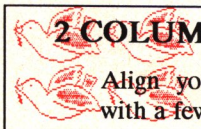
Print and Edit documents at the same

CALCULATOR

Built-in 4 function calculator!

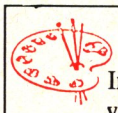
SORTING

Sort lists in a flash!



2 COLUMN PRINTING

Align your text in 2 columns with a few keystrokes!



GRAPHICS

Insert **graphics** in your documents! Allows you to im-port PMODE 3/4, HSCREEN and CoCo Max

SPLIT-SCREEN EDITING

Freeze a portion of text and edit another. Its fantastic!

MAIL MERGE

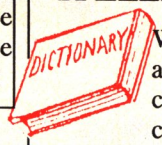
Type a letter, follow it with a list of names & addresses and have Word Power print out personal-ized letters. Its that easy!

SAVING / LOADING

Creates ASCII files that are compatible with other word-processors, terminal programs, etc. Allows directory point & select for easy loading/saving, **Automatic Backup**, file erase, free space display. **ARE YOU SURE?** prompts prevent accidental deletes. The **Auto-Save** feature automatically saves text to disk during user-defined intervals for peace of mind. Supports double-sided drives.

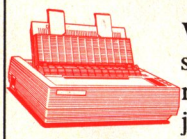
MACROS

Playback up to 250 keystrokes with a sin-gle key! Automate multiple tasks with a single key! You'll love it!



SPELLING CHECKER

Word Power 3.3 include a **80,000** word spelling checker which finds and corrects mistakes in your text.

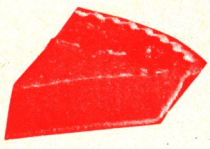


PRINTING

Works with **all** printers that work with the CoCo. Allows options such as baud rates, spacing, page/print pause, partial print, page numbering/ placement, linefeeds, multi-line headers/footers, right justification and number of copies. The values of these options can be changed in the text by embedding Printer Option Codes. The **WHAT YOU SEE IS WHAT YOU GET** feature allows you to preview the text on the screen as it will appear on the printer. You can view margins, page breaks,

PUNCTUATION CHECKER

This checker will proofread your text for punctuation errors such as capitalization, dou-ble-words, a/an usage, spaces and more. Its the perfect addition to any word-proccessor.



DOCUMENTATION

Word Power 3.3 comes with a well-written instruction manual & reference card which makes writing with Word Power as easy as pie. Word Power 3.3 comes on an unprotected disk.

Only

$79.95

Upgrade Policy: Word Power 3.2 owners can get Word Power 3.3 by sending original Word Power disk and $15 to the address listed below.

MICROCOM SOFTWARE, 1387 Brighton-Henrietta, Townline Rd., Rochester, NY 14623

All Word Power 3.3 orders shipped by UPS 2nd Day Air at No Extra Charge in Continental US.

For Detailed Order Information, refer to Page 17 of our 6-page Ad series(Pgs 7-17).

To Place Credit Card Orders Call Toll Free 1-800-654-5244 (9am-8pm 7 days/week)

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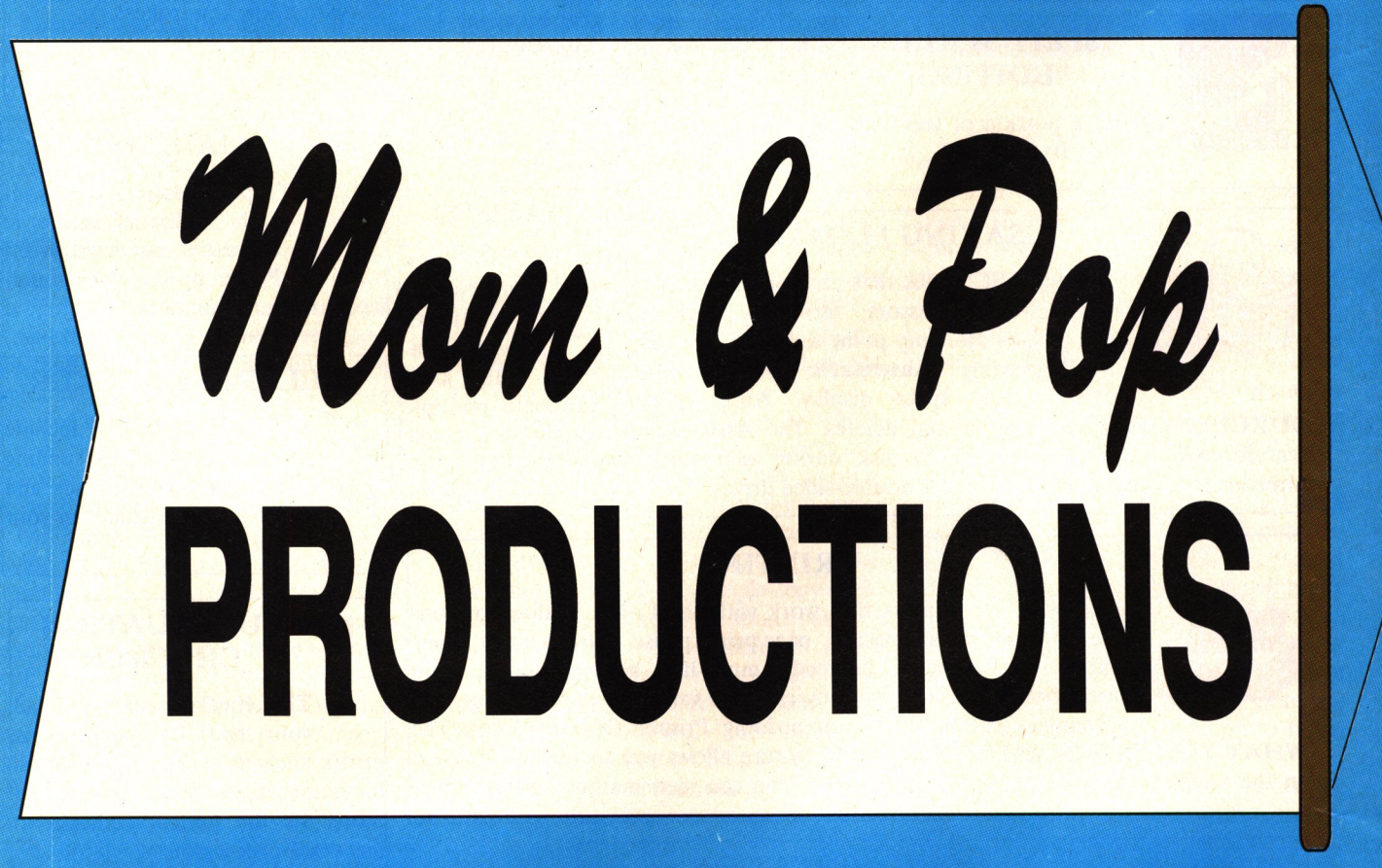
UPS 2ND DAY AIR

CoCo Home Vi

by Mark Haverstock and Bill Wills



leo Companion

Let the CoCo 3 create titles, credits and graphics for your home videos

Are you tired of home videos that look homemade? Those videos with titles and credits on hand lettered cards. Well, put away your markers, cardboard and rulers. Use the CoCo 3 to give your home videos a more polished look. With the right software and a few dollars worth of accessories, yours can be a professional creation with impressive titles, special effects and even some simple animation that can be added to your videos without expensive editing equipment.

Composite Video:
The Link to Your VCR or Camcorder

If you look at the back of a VCR you will notice several jacks, including two marked Video In and Video Out. These jacks are used to make a direct connection to another video accessory, such as a monitor or another VCR. The signal is called composite, or *baseband*, video and contains the picture information to be displayed or recorded in a format known as NTSC (National Television Standards Committee). The informa-

---

Mark Haverstock and Bill Wills are amateur videophiles who hope to be successful on America's Funniest Home Videos. Mark is a teacher and Bill is a quality control engineer for a manufacturing firm. When not writing articles and reviews for computer magazines their spare time is spent on Delphi. Their usernames are DRDEBUG and BASICKID respectively.

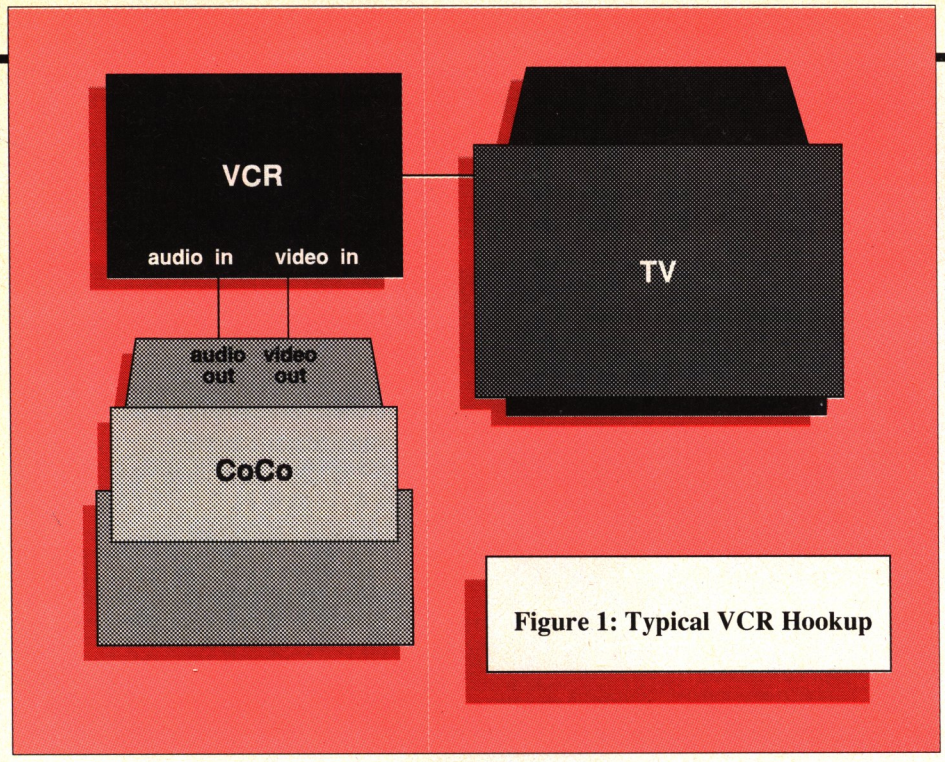


Figure 1: Typical VCR Hookup

tion can be transferred directly and does not need to be tuned to a television receiver.

When plugging a composite video source into a VCR, you can directly record that source. If you look on the back panel of the CoCo 3, you will see two small jacks labeled Audio and Video. These jacks are very similar to those found on the VCR. The CoCo 3 has a composite video output that can be displayed on a monitor or recorded on a VCR.

The CoCo 3 is a great choice for video titling. The RGB output can be hooked to the computer's monitor for previewing. The video output connects directly to the VCR's video input for recording as shown in Figure 1. Finally, the CoCo 3 can produce up to 16 colors at one time.

Working With Video

The CoCo 3 has two video outputs, RGB and composite. These are quite different, so what is seen on the computer's monitor will not necessarily appear the same way on a composite monitor. What you see isn't always what you get. Color and text will differ in tint and clarity. We suggest you watch the image of your final creation on a television connected to the VCR.

Your pictures, titles, credits and animation will be incorporated into your video through separate scenes dubbed to your home video. These are strictly stand-alone sequences suitable for beginnings, endings, intermissions and the like. They will not overlay existing video footage. In other words, you can't blend the graphics titles with pictures that already exist on your videotape. This would require expensive additional Genlock hardware.

Rather than record the graphics titles over the original video tape, we recommend you dub the works to a second video recorder. This prevents accidental erasures on the original tape and provides some flexibility in editing your final production. You can easily remove mistakes and poorly shot scenes for a more polished production.

A typical hookup diagram is shown in Figure 2. It consists of a CoCo 3, a video switchbox or special effects generator, a playback VCR, a record VCR and a TV. If available, a camcorder can be used as the record VCR. Camcorders usually have multiple record heads and sophisticated editing features that may prove beneficial to the overall outcome of your video. An optional video enhancer or amplifier can be included to further improve the quality of your final copy. Audio mixers will blend narration and music for a pleasing effect.

The original footage runs on the playback VCR. Graphics and titles are generated on the computer. You can switch back and forth between the two to create a desired product to send to the record VCR.

You can build a video switchbox for about $5 with parts from your local Radio Shack, or the Radio Shack Audio/Video Control Center (Cat. #15-1956) is a ready-made unit that will work equally well. If additional editing features are needed, the Video Special Effects Switcher (Cat. #15-1274) can handle fades, wipes and audio mixing.

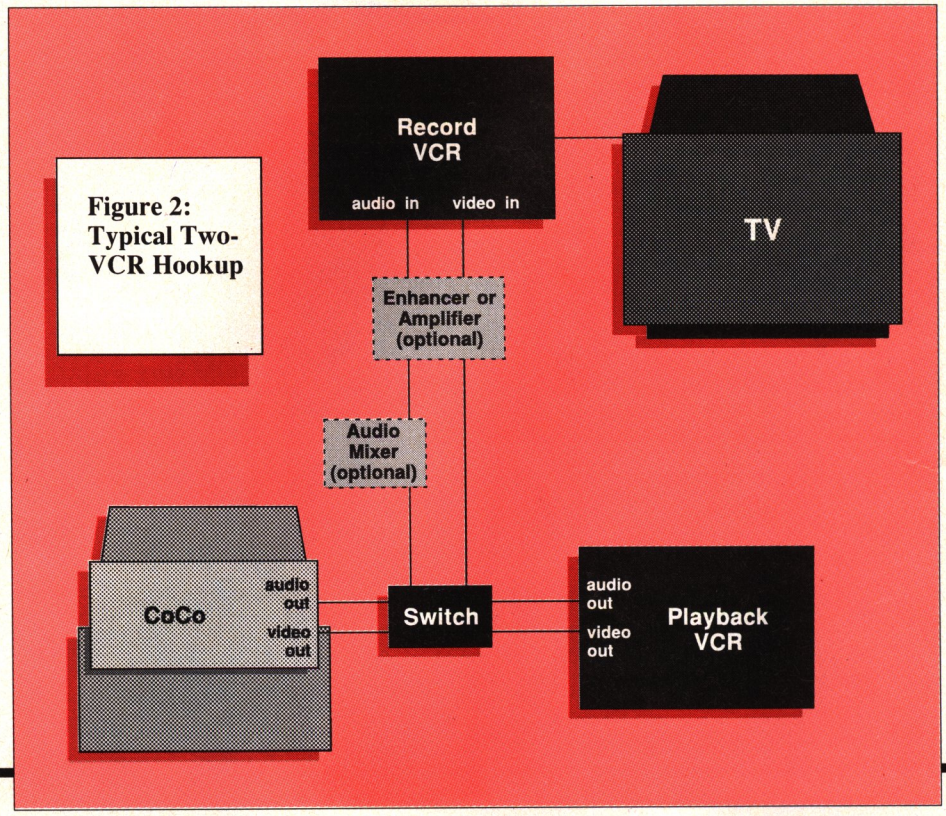


Figure 2: Typical Two-VCR Hookup

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Breathe Life Into Your Color Computer. Gain complete control over your CoCo with these Pokes, Peeks 'n Execs Books. The books will give you the power of Machine Language without leaving the security of Basic. Each book is a collection of "inside" information with explanations and examples. Everyone from the novice to the professional will find these books a wealth of information.

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500 commands such as Basic Program Autostart, Rompak Transfer to Tape, Commands/Keys Disables and much much more! For CoCo 1,2 & 3

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Both the Unravelled Series and Pokes Books: $94.95 (Regular $132.95)

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CoCo 2 Service Manual **$29.95**
Multipak Service Manual **$19.95**
(specify 26-3024/3124)
Full Turn of the Screw - Disto **19.95**
Assembly Language Programming **$18**
Addendum For CoCo 3 **$12**
Color Computer Disk Manual **$29.95**
Start OS9 (Book & Disk) **$32.99**
Inside OS9 Level II **$29.95**
Complete Rainbow Guide to OS9 **$19.95**
Complete Rainbow Guide (2 Disks) **$29.95**
Rainbow Guide To OS9 Level II **$19.95**
Rainbow Guide To Level II Disk **$19.95**

COCO 3 GAMES

(All Programs Require Min 128K Unless Specified)

Sinistar (Req. 512K): $34.95
Those Darn Marbles (Req. 512K): $32

Warrior King: $29.95
In Quest of the Star Lord: $34.95
Hint Sheet: $3.95
Quest for the Spirit Stone: $18
Five Towers of Trafa-Zar: $25
Kyum-Gai: $29.95
Mine Rescue: $24.95
Overlord: $29

Games for CoCo 1,2,3

(All Programs require Min. 32K CoCo unless specified)

Wizard's Castle $19.95. Hi-res graphics adventure filled with tricks, traps & treasure. 64K Req.
Pinball Factory $34.95. Design, build, edit & play the Classic game of pinball. 64K Req

Hall of the King 1, 2, 3 $29.95 each
Hall of the King Trilogy: $74.95
Kung Fu Dude: $24.95
Dragon Blade $19.95
Champion $19.95
Paladin's Legacy $24.95
Seventh Link: $38
Caladrial 2: Weatherstone's End: $54

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UPS 2ND DAY AIR

When making your connections, be sure to use well-shielded video cable and keep the lengths as short as possible. This will assure a quality picture. Never use audio patch cords.

Creating Your Presentation

First draw the graphics and add the titles you want using *CoCo Max III*. After you create the screen, change to the Scroll Page function in the Options menu. This erases the outer border of tools and palettes so only the picture is visible. Revise if necessary and save on disk.

CoCo Show is a graphics viewer included with *CoCo Max III* that helps you

Building an Audio/Video Switchbox

This audio/video switchbox is a great timesaver when dubbing from two sources. If you have to reach behind your VCR to plug and unplug cables when dubbing, you will appreciate the added convenience of having this switchbox.

Switchbox assembly is simple and requires only a few tools. You will need a drill, 1/4-inch drill bit, screwdriver, flat metal file, wire strippers, pliers, soldering iron and solder.

You will also need a metal project box (Cat. #270-239), six phono jacks (Cat. #274-346), a DPDT toggle switch (Cat. #275-636), wire, and dry-transfer lettering, all of which are available from Radio Shack.

Construction

First, remove the cover of the box and the four screws packaged inside. Mark the positions of the holes to be drilled in the top and sides (see Figure 3). Then mark the positions of the holes on the back of the box. Drill all holes using the 1/4-inch drill bit. Use the file to remove any burrs from inside the box. Apply the dry transfer lettering or the optional template to the top of the box. Label the audio and video jacks. Mount the switch in the hole on the top of the box.

Remove the grounding tabs from the phono jacks. Mount each jack in the remaining holes in the back and sides of the box. Be sure to tightly secure the nuts on each so they form a good connection to ground.

Prepare six 3-inch pieces of wire by removing about 1/4-inch of insulation from each end. Wire the audio/video output lines from the two middle terminals on the switch to the jacks on the back of the box (see Figure 4).

Wire the remaining audio/video inputs to the switch as shown in Figure 4. Solder each connection carefully. Be sure to inspect the solder connections for shorts. Test your box by plugging in your computer and VCR as described. If necessary, re-adjust the position of the switch to match the marked switch positions.

Finally, re-assemble the box by carefully tucking the wires inside. As a finishing touch, cover the dry transfer letters with clear nail polish to prevent them from rubbing off. Now you can enjoy the convenience of an audio/video switch for much less than commercially made units.

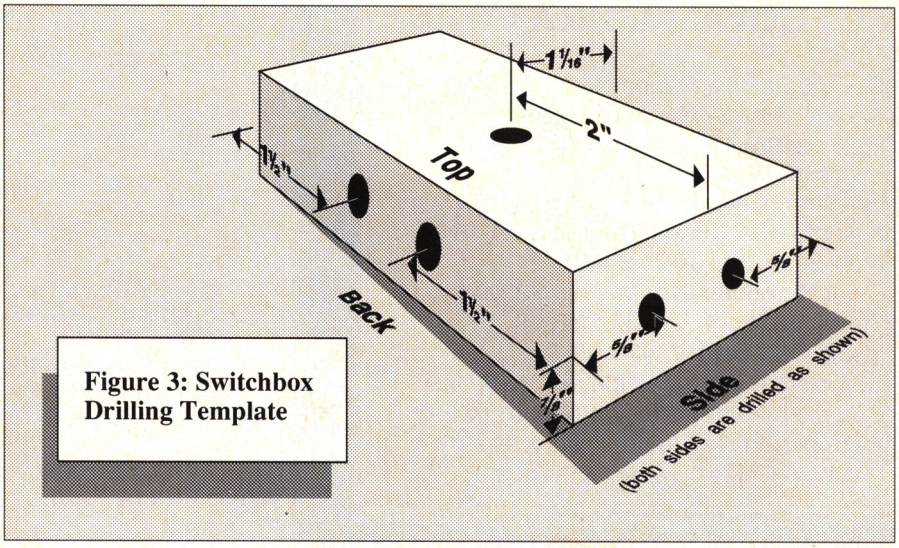

Figure 3: Switchbox Drilling Template

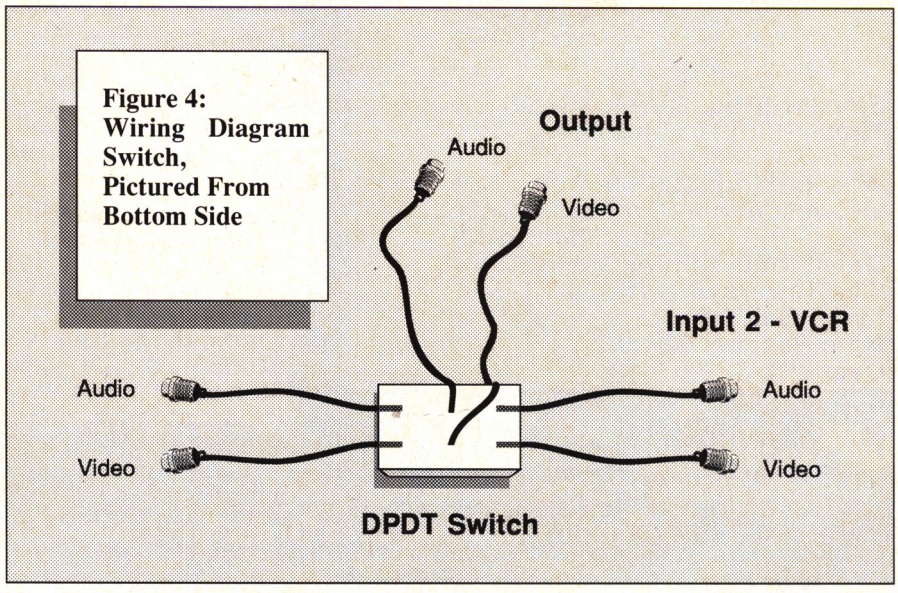

Figure 4: Wiring Diagram Switch, Pictured From Bottom Side

RSDOS UTILITIES (for CoCo 1,2,3 unless otherwise specified)

VALUE DISK PACK $54.95

SUPER TAPE/DISK TRANSFER:$24.95. Copies Basic, ML and Data files from Tape-to-Disk, Disk-to-Tape, Tape-to-Tape and Disk-to-Disk.

DISK UTILITY 2.1A:$19.95. Perfect tool for every disk drive user. Allows blazing fast file copy, kill, rename, directory sort, format and info on programs with extreme flexibility and ease. Very user friendly.

DISK LABEL MAKER:$19.95. Design professional labels with different borders, font styles, double strike and more. Supports DMP, Epson, Gemini, Star and compatible printers.

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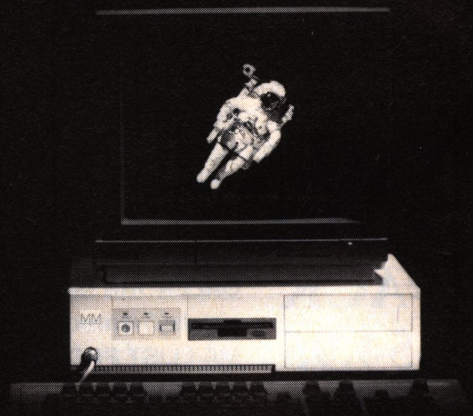

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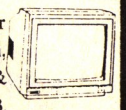

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A Glossary of Terms

Scrolling

Scrolling refers to the movement of text horizontally or vertically on the screen. A common example of scrolling is the list of credits usually seen at the end of a movie. The new text appears on the bottom of the screen, works its way up and finally disappears at the top. Horizontal scrolling is also referred to as *crawl*.

Animation

Animation is the process of making an object appear to move on the screen. Computer animation is accomplished by drawing, erasing and then re-drawing text or pictures with little or no pause time in between.

Transitions

Transitions help to smoothly blend one graphic element of your script into another without the abrupt change from one scene to another. Some of the more common transitions are listed and explained below.

Fade In

A fade in starts with a blank screen and slowly builds to show the complete scene. The effect is similar to standing in a dark room and slowly turning up the dimmer switch to full intensity.

Fade Out

The fade out is the opposite of the fade in. The picture starts at full intensity and gradually fades to a blank screen.

Wipe

A wipe pattern begins by blocking out part of the existing picture and then slowly replaces it with the next picture. Visually a wipe is much like pulling down a window shade and revealing a new image. Wipes are usually from right to left, or from top to bottom on the screen.

Cut

The cut is an instantaneous transition from one shot to another without the gradual change. A common example of the cut is switching between the images of two people filmed during a phone conversation.

Genlock

Genlock is a hardware device that allows you to superimpose graphics or titles over an existing video picture.

organize your pictures. The pictures can be cued one at a time with movement from one to the other by using the spacebar. An optional automatic wipe feature provides smooth transitions from one picture to the next should you decide to use them. The sample screens on RAINBOW ON DISK were created by Bill Wills with *CoCo Max III* and are visible when loaded into *CoCo Show*. CoCo Show is provided on this month's RAINBOW ON DISK (courtesy of Colorware) so you can see examples of animated title screens.

Although we recommend you use *CoCo Max III*, other drawing programs for the CoCo can produce full-screen graphics suitable for video work. Examples of these programs include *Color Max*, *The Rat* and *DeskMate*. These programs' features may vary, but all can help create artwork or import pictures from clip-art disks to create your title screens.

Editing Hints

Tape editing can be a time consuming process. The object is to blend titles, special effects and pictures into an interesting and visually pleasing production with minimal blank spots and jumping in the final copy. Here are some hints designed to help make the editing experience a smooth one.

First load a new blank videotape into your record VCR and set it to record at its highest speed, which is SP on VHS recorders. Prepare the record VCR by simultaneously pressing the record and pause buttons. Use the pause button to stop and start the record VCR to minimize glitches in the final copy. Cue your videotape on the playback VCR and start a few seconds ahead of the scene you want to record. When the proper scene appears release the pause on the record machine. Press pause again after the scene. That's all there is to it. The pause can be left on for up to five minutes on most VCRs before it automatically returns to the stop mode. This should give you enough time to cue the next scene or a title screen.

Switch between the computer and playback VCR when the recording VCR is paused. If you switch while recording, a glitch will appear in the tape. But, with a video special effects switcher you can wipe or fade between either input while the tape is still running. Be sure to preview your computer's video sequences before you record them. Sometimes a stopwatch is helpful when recording the running times.

As we mentioned earlier, dubbing to a second VCR or camcorder is the easiest way to edit. The finished copy becomes a second generation copy of the original video and will not be quite as clear as the first. For this reason you may want to consider a signal amplifier or video enhancer to improve the quality of your final copy.

Sometimes you may have access to only one VCR or camcorder or you just want to add titles to the original tape. If you must add titles to the original copy of the video, many of the newer VCRs have a feature (variously called Video Dub, Edit or Insert) that allows you to re-record a section of video on top of a previously recorded section. This is the mode to use when adding title sequences or graphics to your videotapes. The operation of these features will vary, so consult your owner's manual for more information.

Older Color Computers

If you have a CoCo 1 or 2 with a color composite video adapter, you can still generate titles with *CoCo Max*, *CoCo Max II* and other graphics programs. The connection will be the same as for the CoCo 3. Your capabilities will be somewhat limited based on the graphics program you use.

The last and probably least desirable alternative is to tape the video directly from the computer monitor or TV. Although this process will produce an acceptable picture in most cases, it may contain an annoying flicker due to timing differences between the camcorder and the monitor.

Summary

The composite video output of your CoCo 3 provides the necessary link to your VCR with the capability to add titles, simple animation and video effects to your home videos. With the right software, a few inexpensive accessories and some skillful editing more polished home videos are yours. CoCo Max III is available for $49.95 from Colorware, 242 West Avenue, Darien, CT 06820.

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Wormy

by Dan Tandberg, M.D.

Wormy is a classic computer game rewritten especially for the Color Computer. The object is to steer the worm around the screen and eat the food. When the worm eats, she grows longer and the game grows more difficult. The point is to create as long a worm as possible.

I wrote *Wormy* to run as fast as possible without resorting to assembly-language programming. In fact, at the most difficult levels the game is almost too fast to play. The listing is short enough to be entered in a reasonable length of time and has enough features to satisfy most users. It includes seven levels of difficulty, continuous score display, high score, sound effects and single-stroke restart.

The high degree of speed was achieved through a number of programming tricks, many discussed in prior issues of THE RAINBOW. The main loop was placed near the beginning of the program and calls to subroutines were kept to a minimum. Arrays were used generously to avoid repetitive calculation of frequently used values. The animation was accelerated by using pokes to text screen addresses rather than PRINT @ statements. Variables were substituted for often-used floating-point numbers since these seem to run faster. Complicated floating-point calculations were avoided wherever possible. And finally, BASIC statements were combined to further expedite program execution.

Enter the program exactly as shown in the listing and save a copy before running it. The few spaces that remain should not be deleted or the program will not run properly. The REM statements can be left out. If you have only 16K of RAM you will need to enter PCLEAR1 before loading the program or you'll get an out of memory error when the large array, A(999), is dimensioned.

When run, *Wormy* shows you brief instructions on how to play. Choose your own level of difficulty. I recommend using Level 6 or 7 until you are comfortable at higher levels. The G and H keys move the worm left and right, respectively. The E and F keys move it up and down. If you hit the edge of the screen or hit yourself, the game ends. The worm moves quickly, so keep your fingers placed lightly on these four keys at all times.

As you play, you'll notice some interesting features. The length of your worm and the high score from your previous games are displayed at the top of the screen. The level of difficulty is shown in the lower-left corner of the screen. An undocumented use of the PLAY command has been used to produce the worm's voice (see lines 400-440). Note that as the worm grows, its voice gets deeper and more robust. You may pause the game by pressing SHIFT-@.

This seemingly simple game actually requires some fairly sophisticated strategy since the path taken to the next bite of food determines the pattern of later obstacles. For really high scores, you must learn to make two consecutive right or left turns that cause the worm to double back.

While it's theoretically possible to fill the entire screen with the worm's body, to increase speed I have not included code to actually test for this condition. If you somehow achieve this state (length of the worm = 390) the program goes into an infinite loop at Line 110 since there will be no unused space to place the next bite of food. Consider this as winning.

The Listing: WORMY

```
0 'COPYRIGHT 1990 FALSOFT, INC.
10 ' WORMY
     DAN TANDBERG, M.D.
     ALBUQUERQUE, NEW MEXICO
20 GOTO250
30 'MAIN LOOP
40 X=PEEK(A(H)):IF X<>C THEN100
50 POKEA(H-U),Q:POKEA(H),P:IFG<U
 THENPOKEA(H-L),C ELSEG=G-U:L=L+
U:PRINT@26,L;
60 PLAYS$(K):IFH=M THENGOSUB170
70 K$=INKEY$:IFK$>"D"ANDK$<"I"TH
ENK=ASC(K$)-68
80 A(H+U)=A(H)+D(K):H=H+U:GOTO40
90 'EATS FOOD
100 IFX<>R THEN150ELSEPLAYS$(7)
110 F=1088+RND(414):IFPEEK(F)<>C
 THEN110
120 V=3+INT(L/14):O=5-INT(L/50):
IFO<U THENO=U
130 G=G+RND(16):POKEF,R:GOTO50
140 'HIT WALL OR TAIL?
150 IFX=B THENPLAYS$(5):PRINT@10
6,"hit the wall!";:GOTO190ELSEPL
AYS$(6):PRINT@106,"hit yourself!
";:GOTO190
160 'RELOCATE ADDRESSES
170 FORI=1TOL:A(I)=A(H-L+I):NEXT
I:H=I-U:RETURN
180 'REPLAY
190 IFL>Z THENZ=L
200 PRINT@426,"another game?";:G
OSUB220:IFK$="N"THENSTOPELSE330
210 'PAUSE
220 K$=INKEY$:IFK$<>""THEN220
230 K$=INKEY$:IFK$=""THEN230ELSE
RETURN
240 'INSTRUCTIONS
250 CLS:PRINT"INSTRUCTIONS:",,,,
"USE THE E,F,G&H KEYS TO MOVE TH
EWORM AROUND THE SCREEN.  EAT TH
EFOOD TO GROW LONGER.  IF YOU HI
TYOURSELF OR THE EDGE OF THE
 SCREEN YOU'LL DIE.  HOW LONG CA
NYOU GROW?"
260 'INITIALIZE
270 M=999:DIMA(M),D(4),S$(7):FOR
I=1TO4:READD(I):NEXTI:FORI=1TO7:
READS$(I):NEXTI:Z=0
280 P=98:'HEAD
290 Q=79:'TAIL
300 R=103:'FOOD
310 PRINT@416,"CHOOSE DEGREE OF
DIFFICULTY     (1 IS HARD  7 IS
EASY)":GOSUB220:D=VAL(K$):IFD<10
RD>7THEN310ELSE:T=INT(128/D-10):
L$=K$
320 'RESTART
330 CLS0:B=PEEK(1024):'EDGES
340 C=143:'FOREGROUND
350 PRINT@1,"     ";:PRINT@1,Z;:
PRINT@14,"wormy";:PRINT@26,"
 ";
360 FORI=64TO448STEP32:PRINT@I,C
HR$(B);STRING$(30,C);CHR$(B);:NE
XTI:PRINTL$;
370 A(0)=1056+32*RND(13)+RND(16)
:POKEA(0),Q:A(1)=A(0)+1:POKEA(1)
,Q:A(2)=A(1)+1:POKEA(2),P:L=2:H=
2:K=4:U=1:GOTO110
380 DATA-32,32,-1,1
390 'SOUNDS
400 DATA T=T;O=0;V=V;6;5
410 DATA T=T;O=0;V=V;5;4
420 DATA T=T;O=0;V=V;8;7
430 DATA T=T;O=0;V=V;9;8
440 DATA T80;O1;V31;9;2;5;8;2;5;
3;7;1;7;4;1
450 DATA T40;O1;V31;1;2;1;2;1;2;
1;2;O5;P2;2
460 DATA T80;O5;V9;8;9;8
470 END
```

Legends of the C

by Dale L.Puckett
Contributing Editor

Long winter evenings provide an opportunity to dig into another programming language. So let's take another look at the C compiler package originally sold to run under OS-9 Level I. Perhaps you can be encouraged to take that dusty package off the shelf and break new ground. We'll start by setting up the system.

The disks shipped with Microware C for the Color Computer are very full. In fact there are only 109 free sectors remaining on the C Compiler disk and 199 on the C Library disk. This presented problems when the package was released in 1985 and most OS-9 users struggled with 35-track, single-sided disks. Now with the availability of many hard disk and RAM disk systems and the added versatility of OS-9 Level II running on a 512K CoCo 3, most people find C much easier to tackle today than it was just five short years ago.

If you are still struggling with an older disk system, here's a tip that may help you. It is sometimes easier to create several system disks; one for writing and testing assembly language programs, one for BASIC09 programs and another for C language programming sessions.

There are two ways to make multiple system disks. You can use `cobbler` or `os9gen` to put the `os9boot` file on each of your system disks. If you do this you will be able to boot OS-9 with the disk containing the programs you need for the particular task at hand.

Dale L. Puckett, a freelance writer and programmer, serves as director-at-large of the OS-9 Users Group and is a member of the Computer Press Association. His username on Delphi is DALEP: on packet-radio, KOHYD @ N4QQ; on GEnie, D.PUCKETT2; and on CIS, 71446,736.

If you would rather not invest the time to create a new `os9boot` file on half a dozen disks and use `dsave` to move the required programs to each `CMDS` directory, simply maintain one system disk and a number of system programming disks. When you take this route, you will need to boot OS-9 with your single system disk and then swap disks to insert the system programming disk with the programs you need for the language you plan to use.

Don't skip this step: After inserting the system programming disk use the `chx` command to make the `CMDS` directory on that disk your current execution directory. In other words after you remove your boot disk and insert your C programming disk you must enter the following:

```
chx /d0/cmds
```

This command tells OS-9 where to look for the utilities and programs you will be running. We're assuming you have used the `makdir` command to create the `CMDS` directory on your C programming disk. You will need to create a `CMDS` directory on all system programming disks. After you create the `CMDS` directories, store the required executable object code files (the commands) in each new directory. Each `CMDS` directory will be different. For example, you'll need a different set of utility programs for word processing or BASIC09 programming than for C programming.

Since the `CMDS` directory on the C Compiler disk from Radio Shack uses all but 109 sectors on the disk, use a backup copy of this disk as your programming disk C. You can use those 109 sectors to store a few additional tools to make programming easier. For example, you'll need to copy your favorite editor into the `CMDS` directory on this disk. You may also find a few compare and word-search utilities such as `comm`, `diff` and `grep` useful.

You can use the `copy` command to move a few utilities into your new `CMDS` directory. If you're copying a number of utilities into this directory, the `dsave` utility will be easier.

Don't forget the golden rule of computer operation: Do not make these changes on your original C Compiler disk from Radio Shack. Instead, immediately put a write protect tab on that valuable disk. Then make a copy of it using `backup`. Put your original C Compiler disk away to make a new copy should something happen to your working disk.

So far we have taken care of the C programming disk you will use in `/d0`. Now, we'll look at the disk needed for Drive 1. It's a fact of life that to program in C using Color Computer OS-9, two disk drives are needed. For large programs, three drives are needed if you use the single-sided, 35-track drives first released for the Color Computer. But if you use 40- or 80-track, double-sided disk drives, two drives are sufficient.

When you purchased Microware's C Compiler from Radio Shack you received two disks. The second disk is called the C Library. It contains three directories; `DEFS`, `LIBS` and `SOURCES`. The C Compiler expects to find the `DEFS` and `LIBS` directories on a disk mounted in `/d1`. If they are not found there, the compiler will not work.

The paths to the `DEFS` and `LIBS` directories are hard coded in the C compiler to point to `/d1`. If you own a hard drive, or even a double-sided drive, you will want to patch your compiler so it looks for these directories on the default drive (`/dd`).

The `DEFS` directory contains a file called `OS9defs.a`, which stores the definitions needed by `c.asm`, the relocatable macro assembler included in the C Compiler package.

Take a look at any of the assembly language source files in the `SOURCES` direc-

tory. They are the ones with the .a extension. You'll find most of them contain the line:

```
USE ..../defs/os9defs.a
```

Essentially this tells the assembler to insert the source code stored in a file named os9defs.a, located in a directory named DEFS. Again, the assumption is that the DEFS directory is on the same drive as the SOURCES directory, /d1. When the assembler reads this file, it learns the symbolic names of the many OS-9 function calls and variables.

On closer examination of the DEFS directory on the C Library disk you'll find a number of files with an .h extension. These are C header files. Header files usually contain collections of #define statements or declarations and are read by the compiler when you use an #include statement in your program. With #include statements in your large programs you can guarantee that all the source files will use the same definitions and variable declarations. Remember that if you change a header file you must reconstruct all files that use it.

For example, if you need the definitions that deal with OS-9 signals you must include this line in your program source code.

```
#include <signal.h>
```

The left and right angle brackets tell the C compiler to look for a file named signal.h in the DEFS directory. If you have stored header files in other directories you can tell OS-9 where they are located by including a complete pathlist to the file enclosed in double quotes. For example:

```
#include "/dd/ALTDEFS/signal.h"
```

Since the stdio.h file will be needed with almost every C program you write, you'll need the DEFS directory on the disk in /d1, unless you've modified your compiler to use the default drive /dd. As your C programming career begins, you probably won't use the other files in the DEFS directory very often. But, leave them intact. You'll need them when you compile programs from other sources such as the OS-9 Users Group Software Library or RAINBOW ON DISK.

The LIB directory contains a file named clib.l, which stores the standard library functions, math functions and other object code needed by the system. Another file in that directory is named cstart.r and contains code needed in all compiled programs. It must be in the LIB directory and that directory must be in a disk mounted in Drive /d1, or /dd if you've modified the compiler.

The SOURCES directory holds the source code for three useful sample programs and a directory named SYS that holds the assembly language source code used to generate portions of the object code in the clib.l file. Studying these files will help you understand how the C Compiler works.

Most people find C much easier to tackle today than it was just five short years ago.

If you are working with the Radio Shack 35-track, single-sided drives, you should delete the SYS directory from the SOURCES directory to create more space for your own source code. You can also delete the sample C source code. Just remember to delete these files from your backup copy of the C library disk and not the original disk from Radio Shack. There were 199 free sectors available on the C Library disk before you deleted the SYS directory, so you should have plenty of room.

While learning this new language don't forget the basics. Remember, the C compiler will look for your source code and data files in your current data directory. The SOURCES directory would be a good starting place. Don't forget to use the chd command before you start compiling your C programs. To do this, type:

```
chd /d1/sources
```

Now that you have set up your two disks (the C Compiler for Drive /d0 and the C Library for Drive /d1) you are ready to begin programming. Use your favorite editor to create a file containing a short program. For example you could use this model from page six of Kernighan and Ritchie's *The C Programming Language*.

```
main()
{
   printf("hello, world\n");
}
```

After you type this short program, save it in a file named hello.c. You're almost ready to compile your first C program. First make sure your C Compiler disk is in /d0 and your current execution directory is /d0/CMDS. Also, make sure your C Library disk is in /d1 and your current data directory is /d1/SOURCES. Then, enter the command:

```
cc1 hello.c
```

When you press ENTER, your disk drives will begin to spin and after several minutes you'll see something like this on your screen:

```
'hello.c'
c.prep:
c.pass1:
c.pass2:
c.opt:
c.asm:
c.link:
```

The name of the source file you are compiling is hello.c. The other lines tell which part of the C Compiler is running. You'll notice that /d0 starts spinning each time a new line appears on the screen. It is loading the next program into memory.

Look in your current data directory after you compile the above program to see a file named c.com. List it to learn why the above messages appeared on your screen. You'll also see what OS-9 did throughout the compiling process. Let's look:

```
echo 'hello.c'
-x
echo c.prep:
C.PREP hello.c >ctmp.4.m
x
echo c.pass1:
C.PASS1 ctmp.4.m -o=ctmp.4.i
del ctmp.4.m
echo c.pass2:
C.PASS2 ctmp.4.i -o=ctmp.4.a
del ctmp.4.i
echo c.opt:
C.OPT ctmp.4.a ctmp.4.o
del ctmp.4.a
echo c.asm:
C.ASM ctmp.4.o. -0=ctmp.4.r
del ctmp.4.o
echo c.link:
C.LINK /d1/lib/cstart.r ctmp.4.r
-o=hello -l=/d1/lib/clib.l
del ctmp.r
```

Let's study this listing. c.com is an OS-9 procedure file generated by cc1. It puts the various parts of the C compiler through its paces.

The first line in this procedure file tells

OS-9 to echo the name of the file being compiled. It then sends the built-in Shell command, `-x`. This tells the Shell not to abort the process if an error occurs.

After sending this signal the procedure file echoes `c.prep:` on your screen letting you know the name of the program it plans to run next. It then sends the command to run `c.prep`. The same line tells `c.prep` to get its input from the file named `hello.c` in your current data directory and to put its output into an intermediate file named `ctmp.4.m`.

When `c.prep` completes its job, the procedure file sends an `x` command to the Shell. This tells the Shell to abort if there is an error. It then echoes `c.pass1:` and proceeds to run that program.

Notice that `c.pass1` gets its input from the file named `ctmp.4.m` that was just created by `c.prep`. `c.pass1` sends its output to a file named `ctmp.4.i`.

As you study the rest of the `c.com` procedure file a pattern will become obvious. OS-9 is using a series of temporary files to store intermediate results. The output of one part of the compiler is put into a temporary file used as the input for the next part of the compiler. After the temporary files have been used, they are deleted.

```
#include <time.h>

struct sgtbuf buf;

/* Your "main ()" program goes here */
getime(&buf);
printf("%02d/%02d/%02d %02d:%02d:%02d\n",buf.t_month, buf.t_d
ay, buf.t_year, buf.t_hour, buf.t_minute, buf.t_second);
```

Figure 1: Clock Program

These temporary files act like a pipe. The difference is the compiler is so large that it won't all fit in memory at once. The temporary files are needed to hold the results from one part of the compiler while the next part is loaded into memory. This was the only way to make the compiler work on the older Level I systems.

Work your way through the procedure file one line at a time until you understand what happens during each part of the compilation. Notice that several compiler parts can be used as stand-alone programs. For example you can use the relocatable macro assembler (`c.asm`) to create an assembly language source file that you have written. When you write in the C language the compiler writes an assembly-language source-code file for you.

When you get to the command for `c.link`, the linker program, it will be obvious why you must have a directory named `LIB` on a disk mounted in `/d1`. The linker reads two files from this directory, `cstart.r` and `clib.l`.

We haven't jumped into the mystery of C programming in this short tutorial, but hopefully we have helped you understand how to set up your Color Computer OS-9 system to effectively use the Microware C compiler.

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C programmers. Often you want to print the time somewhere in your programs. The code in Figure 1 should do the job.

When your program runs this code it should print the time in the standard mm/dd/yy hh:mm:ss format. The %02d's in the code above tell printf you want the information printed in decimal. You always want it printed as two digits with a leading zero as a pad if necessary. In other words New Year's Day will come out as 01/01/91, not 1/1/91.

One more note about C. Many people say they don't like C because the code it generates is too long. Before you jump to this conclusion, consider this: You can't really compare the size of a finished C program to a BASIC09 program unless you play fairly and count the size of BASIC09's runb module.

Remember that runb must be in memory if you are going to run your packed BASIC09 programs directly from your execution directory. When this factor is added you realize that C programs are really shorter than BASIC09 programs since the standard C library stored in clib.l is shorter than runb.

If you're fortunate enough to own a 512K CoCo 3 running OS-9 Level II, you can really speed up the C compiler by making a quick patch to the cc1 file and preloading the modules used by the C compiler. In the cc1 file the string /d1 is located at an offset of $0EE4 from the beginning of the module. In hexadecimal this string reads 2F6431. Using modpatch or debug, change the 31 to 64 and save a new copy of cc1. This forces the linker to look for the LIB directory on Drive /dd (your hard drive or high-capacity floppy).

To preload the compiler, use build to create the following procedure file:

```
load cc1
load c.prep
load c.pass1
load c.pass2
load c.opt
load c.asm
load c.link
```

With 512K you should be able to load most, if not all, the C compiler modules into memory. This step, along with the patch above, will cut your compiling time to less than a minute. You can speed compilation even further by putting your source code in a RAM disk and changing your current data directory to the RAM disk. This will cause the compiler to write its temporary files to the RAM disk.

Disto Delivers a Megabyte of Memory

Once again Tony DiStefano has teamed up with Chris and Joanne Rochon at CRC to deliver another landmark OS-9 solution. Thanks to Tony's genius and Kevin Darling's programming prowess, you can now equip your CoCo 3 with one megabyte of memory. The Disto kit adds to the page switching capability in your CoCos GIME so that it can access the entire megabyte of memory. I recently installed the kit and was astounded with my first free memory report. After loading *DynaStar* and BASIC09 and several sets of utilities, I entered mfree. The program reported 864K of available memory.

Installation in my CoCo 3 was particularly easy since I had previously installed the 6809 microprocessor in a socket. Disto's kit adds two small internal boards to your CoCo. The first has 512K and is equipped with sockets that let you plug the original 512K on top of it. The second board holds the page switching circuit that lets the GIME recognize the extra memory. This second board must be soldered to all 40 pins of the 6809.

Operation of the CoCo 3 with a full megabyte of memory is a whole new experience. You can almost preload every OS-9 program you own into memory and have it available within a split second. It's also a real gift for C programmers since it lets them preload all of the C compiler modules in memory with enough space left over to create a small RAM disk to store and read the many temporary files created by the compiler. These two steps can cut your compile time to a fourth of its original.

For a detailed technical review of the Disto One Megabyte add-on kit, see the excellent review by Greg Law in the August 1990 issue of THE RAINBOW.

A *Multi-Vue* Word Processing Shell

Zack Sessions is a CoCo developer who has jumped on the *Multi-Vue* bandwagon. Zack can be contacted through Colorsystems, Box 540, Castle Hayne, NC 28429. *WPShell* is a word processing-oriented graphics Shell that delivers a point and click interface with pull-down menus to do your word processing chores. It is similar in appearance to *Multi-Vue*'s gshell and *MVCanvas* from HyperTech. Essentially it brings all major word processing tasks together under one Shell. You supply your favorite text editor, text formatter and spelling checker programs. *WPShell* integrates them into one package. *WPShell* is a bargain at $22. It requires the windint module from your Radio Shack *Multi-Vue* disk.

With *WPShell*, you can combine an existing public domain text editor, text formatter, spelling checker and a more utility to build a full powered word processing system. It also makes these tools available with a click or two of your mouse button. It was written in 6809 assembly language using the RMA assembler. The more utility is a staple from the UNIX world that displays the contents of a file to the standard output path one screen at a time. It then waits for further instruction from you on whether to display the next screen, back up or skip forward. Sessions recommends Pete Lyall's excellent OS-9 port of the UNIX standard.

WPShell is easily installed. Simply copy the program to the /dd/CMDS directory and copy the wpenv.file to your /dd/SYS directory. Once these files have been copied, edit the environment file (wpenv.file) to match your system.

Free Ham/OS-9 BBS Online

The Thermal Fusion BBS in Greenville, SC, is now online and available. It is dedicated to all owners of CoCo 2s and 3s and is of special interest to amateur radio operators as well as OS-9 users. To connect, call 803-862-7544 at any speed between 300 and 9600 bps. Use eight bits with no parity and one stop bit.

Unlimited shareware uploads and downloads are permitted. You'll find many OS-9 programs and many BASIC games and utilities. Amateur radio operators will find radioteletype and slow-scan television software as well as satellite-tracking programs. Of special interest to hams is the WJ5W *CoCo Packet Radio Bulletin Board*, Version 4.02. Monty W. Haley wrote the BBS program and normally distributes it with his *CoCo Packet Radio Terminal* program (CoCoPACT). Although CoCoPACT is not an OS-9 program, you can buy it directly from Haley at Route 1, Box 210-B, Evening Shade, AR 72532. Another amateur packet radio program is *CoCoPacket*, available from Brian Carling at 5131 Raywood Lane, Nashville, TN 37211. Thanks to Skip Mehlenbacher, W8HFA, for the tip.

While we're on the subject of amateur radio, thanks to James Jones of Microware for my copy of the object and source code for the public domain KA9Q TCP/IP OSK network program. It's an earlier version dated from late 1986. Any amateur who needs this code as a starting point for a conversion to OS-9 for the CoCo may contact me at K0HYD@WF0A. Incidentally, my IP address is [44.122.0.4].

That wraps up another year of KISSable OS-9. Have a happy holiday season and an outstanding new year. Until January, keep on hacking!

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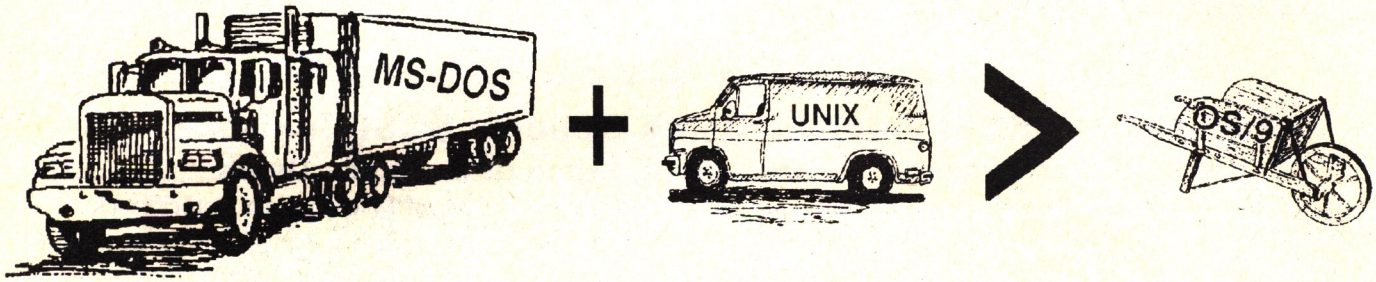

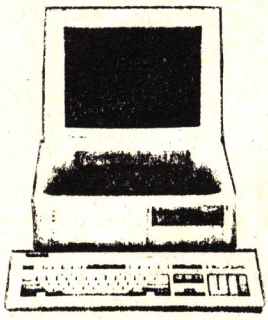

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*SCSI controller is OMTI 5100. Add $75 for OMTI 5200 with FDC.

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(Note: We have no drivers for tape yet)

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Case, 45 Watt PS, Fan	$105.
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The Tour Continues

by Fred B. Scerbo
Contributing Editor

If you have an idea for the "Wishing Well," submit it to Fred c/o THE RAINBOW. *Remember, keep your ideas specific, and don't forget this is* BASIC. *All programs resulting from your wishes are for your use, but remain the property of the author.*

Last month we introduced the graphics needed to create an educational program that reviewed the 50 states. This month those graphics are merged with a revised version of the *Match Game* that was introduced many months ago.

I hope by now most of you have a working copy of *The 50 States* from last month. You may have noticed the article was short and the program listing was very long. The data statements required were rather complex since over one hundred were needed to create the graphics maps and titles for the 50 states. And that doesn't even include the additional data statements that create the title card or those that create the string locations for positioning the graphics.

This month's listing is no exception. The data statements that create the maps and titles remain exactly the same as in last month's listing. I have even used the same line numbers for these data statements, so it is not necessary for you to retype the entire listing.

Fred Scerbo is a special needs instructor for the North Adams Public Schools in North Adams, Massachusetts. He holds a master's in education and has published some of the first software available for the Color Computer through his software firm, Illustrated Memory Banks.

Getting Started

Load your working copy of *The 50 States* from last month into your CoCo. The lines to save are those between 1000 and 2490. Therefore, enter `DEL -999` and `DEL 2491-` to get rid of the old lines.

This program is a good way to review material presented in *The 50 States.*

Next, take this month's listing and enter all the remaining lines of the program. This will save you a considerable amount of time.

You can also use these same commands to create last month's program from this month's listing. First, delete the extra lines after this month's listing has been typed and saved. Then enter the remaining lines from last month's program.

So What's New?

Earlier in this column I mentioned this is a revised version of our original *Match Game*. The program originally used the `PCLEAR8` and `PCOPY` commands to increase the speed of the graphics. However we are now using a much larger graphics array to store these 50 states. *Match Game* originally stored only 20 sets of opposites. As you can see, the number of graphics used has been more than doubled and we would very quickly run out of usable memory with these original commands. The `PCLEAR8` command alone eats up four additional graphics pages of usable memory. Therefore, I went through the original listing and killed any references to `PCLEAR`, `PCOPY` and any graphics page higher than four. (Thus, `PMODE4,5` would be out of the question.)

I quickly discovered my original use of the `PCOPY` command was unnecessary since this version seems to execute as quickly as the original. (This also means I can now make plans for larger uses of this shell since its storage capacity has more than doubled. Any ideas out there?)

Using the Program

You get our standard title card when you run this program. Since this version does not allow you to kill part of the graphics like the earlier version, you simply press ENTER to start the game.

This game involves two players and is a standard *Concentration*-type game. Each player uncovers two squares at a time. Use the arrow keys to move the flashing cursor around the screen. When you reach a square you want to choose, press ENTER. When a match is made, it is recognized by the computer. To let the next player take a turn, press the Spacebar. When the game is over, the scorecard will indicate the winner.

This program is a good way to review material presented in *The 50 States*. You really do not need last month's program to enjoy this one. By itself, *The Match Game of 50 States* can be fun for young and old alike. Let me know what you think.

Conclusion

I think by now many of our regular readers know how flexible these various shell programs can be. If you have an idea for material that could be included in these kinds of formats, drop a wish in the "Wishing Well." You might stimulate an idea that could lead to an actual program listed in these pages.

See you next month. ❑

32K Extended

2Ø	97	117Ø	132	192Ø	24
45	94	123Ø	23	198Ø	228
75	41	13ØØ	135	2Ø4Ø	3
13Ø	215	137Ø	255	21ØØ	23
175	18	144Ø	226	216Ø	116
215	114	151Ø	96	222Ø	79
275	215	156Ø	74	228Ø	129
335	135	162Ø	2Ø3	236Ø	252
365	38	168Ø	212	242Ø	134
4Ø5	235	174Ø	132	END	32
1Ø5Ø	111	18ØØ	22		
112Ø	185	186Ø	185		

The Listing: MATCH5Ø

```
1 REM**************************
2 REM* MATCH GAME OF 5Ø STATES *
3 REM*   COPYRIGHT (C) 199Ø    *
4 REM*    BY FRED B. SCERBO    *
5 REM*    6Ø HARDING AVENUE    *
6 REM*  NORTH ADAMS, MA Ø1247  *
7 REM**************************
9 CLEAR2ØØØ
1Ø CLSØ:PRINTSTRING$(64,22Ø);:FO
RI=1TO256:READA:PRINTCHR$(A+128)
;:NEXT:PRINTSTRING$(64,211);
15 DATA46,46,42,46,44,42,46,46,4
2,46,45,36,42,37,4Ø,1Ø1,1Ø8,1Ø8,
1Ø1,1Ø8,1Ø9,1Ø1,1Ø9,1Ø9,1Ø1,1Ø8,
1Ø8,53,6Ø,58,48,48
2Ø DATA42,42,42,43,35,42,,42,,42
,,,43,39,,1Ø1,,99,1Ø1,99,1Ø3,1Ø1
,1Ø1,1Ø1,1Ø1,99,99,53,51,58,51,5
1
25 DATA42,,42,42,32,42,,42,,42,3
3,,42,37,,1Ø1,,1Ø1,1Ø1,,1Ø1,1Ø1,
,1Ø1,1Ø1,,,48,,,59,51
3Ø DATA4Ø,,4Ø,4Ø,,4Ø,36,44,,44,4
4,36,4Ø,36,4Ø,1ØØ,1Ø8,1Ø8,1ØØ,,1
ØØ,1ØØ,,1ØØ,1ØØ,1Ø8,1Ø8,,,,56,
35 DATA126,124,124,124,124,12Ø,113,1
24,124,124,114,48,53,6Ø,6Ø,56,62
,61,6Ø,58,62,6Ø,6Ø,58,62,61,6Ø,5
8,62,6Ø,53,6Ø,6Ø
4Ø DATA123,115,115,115,,117,,,11
2,122,48,53,51,51,5Ø,56,53,,56,5
9,51,51,58,56,53,,56,59,51,53,51
,51
45 DATA,,,112,122,117,,,112,122,
,48,,,58,,53,,,58,,48,58,,53,,,5
8,,,,53
```


CoCoPRO! was proud to announce the introduction of a **new** game from the illustrious **Steve Bjork**, at the **Atlanta CoCoFEST!** Although this game was written exclusively for Fest attendees, we are offering our **last 100** copies for sale to those who couldn't join us!

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```
50 DATA121,115,115,115,120,116,1
15,115,115,120,48,49,51,51,58,,5
5,50,,59,48,49,58,,55,50,,59,51,
49,51,55
55 PRINT@422,"  BY FRED B.SCERBO
  ";:PRINT@454," COPYRIGHT (C) 1
990 ";:PRINT@486,"  <ENTER> TO B
EGIN  ";
60 X$=INKEY$:X=RND(-TIMER):IFX$=
""THEN60
65 IFX$=CHR$(13)THEN75
70 GOTO60
75 DIM SC(2),M(2),HH(2),VV(2),H(
4),V(4),K$(4,4),K(4,4,2),P$(100)
,P(16),B$(20),C$(20),A(20),N(100
),B(4),C(4),D(4),E(4),F(4),AO(20
)
80 FORI=1TO100:READP$(I):NEXT
85 COLOR1,0
90 REM START
95 CLS0
100 GOTO110
105 DIMK$(4,4),K(4,4,2),P$(40)
110 PMODE4,1:PCLS0:SCREEN0,0:CLS
0:PRINT@263," PLEASE STAND BY ";
115 PT$(1)="NG4D10NL4NR4":PT$(2)
="BL4ND2R6D4L6D6R6":PL=2
120 FORY=4TO250STEP63:YY=YY+1
125 H(YY)=Y
130 II=0:FORI=2TO148STEP44:II=II
+1:V(II)=I:LINE(Y,I)-(Y+58,I+40)
,PSET,BF:K$(YY,II)="BM"+STR$(Y)+
","+STR$(I):NEXTI,Y
135 POKE178,0:COLOR1,0:LINE(0,17
8)-(256,192),PSET,BF
140 CR$="S4C0R58D40L58U40C1R58D4
0L58U40"
145 COLOR1,0:FORI=1TO4:FORY=1TO4
:FORQ=0TO20STEP2:LINE(H(I)+Q,V(Y
)+Q)-(H(I)+58-Q,V(Y)+40-Q),PRESE
T,B:NEXTQ,Y,I
150 FORI=1TO4:FORY=1TO4:DRAWK$(I
,Y)+CR$:NEXTY,I
155 FORI=1TO100:N(I)=0:NEXTI
160 FORI=1TO8
165 P(I)=RND(50)*2:IFN(P(I))=1TH
EN165
170 N(P(I))=1:NEXTI
175 FORI=1TO8:P(I+8)=P(I)-1:NEXT
I
180 FORI=1TO100:N(I)=0:NEXTI
185 FORI=1TO4:FORY=1TO4
190 K(I,Y,1)=RND(16):IFN(K(I,Y,1
))=1THEN190
195 N(K(I,Y,1))=1:NEXTY,I
200 FORI=1TO4:FORY=1TO4:K(I,Y,1)
=P(K(I,Y,1)):NEXTY,I
205 REM:FORI=1TO4:FORY=1TO4:DRAW
K$(I,Y)+"BD4C0S2":DRAWP$(K(I,Y,1
)):NEXTY,I
210 DRAW"C0BM76,190S4U8R10D4NL10
BR6U4D8R8BR6U8R10D4NL10D4BR10U4N
H4E4BR4NR10D4NR10D4R10BR6U8R10D4
L10R6F4"
215 SCREEN1,1:IFPL=2THENPL=1ELSE
IFPL=1THENPL=2
220 IF SC(1)+SC(2)=16THEN370
225 COLOR1,0:LINE(170,180)-(182,
192),PSET,BF
230 IFPL=1THENDRAW"BM174,190S4C0
R8L4U8G2"ELSEIFPL=2THENDRAW"BM17
4,190S4C0NR8U4R8U4L8D2"
235 V=1:H=1:FOR TR=1TO2
240 DRAWK$(H,V):DRAWCR$
245 X$=INKEY$:IFX$=""THEN240
250 IFX$=CHR$(13)THEN295
255 P=ASC(X$)
260 IFP=8THENH=H-1
265 IFP=9THENH=H+1
270 IFH=0THENH=1:GOTO240:ELSEIFH
=5THENH=4:GOTO240
275 IFP=94THENV=V-1
280 IFP=10THENV=V+1
285 IFV=0THENV=1:GOTO240ELSEIFV=
5THENV=4:GOTO240
290 GOTO240
295 IFK(H,V,2)<>0THEN240
300 COLOR1,0:LINE(H(H),V(V))-(H(
H)+58,V(V)+40),PSET,BF
305 DRAWK$(H,V)+"BD4C0S2":DRAWP$
(K(H,V,1)):K(H,V,2)=-1
310 SCREEN1,1
315 M(TR)=K(H,V,1)
320 HH(TR)=H:VV(TR)=V
325 NEXT TR
330 IFINT(((M(1)/2)+.5))<>INT(((
M(2)/2)+.5))THEN340
335 FORI=1TO2:DRAWK$(HH(I),VV(I)
)+"BD8C0S2":DRAWP$(K(HH(I),VV(I)
,1)):NEXTI
340 IFINKEY$<>CHR$(32)THEN340
345 COLOR1,0:FORI=1TO2:LINE(H(HH
(I)),V(VV(I)))-(H(HH(I))+58,V(VV
(I))+40),PSET,BF:NEXTI
350 IFINT(((M(1)/2)+.5))<>INT(((
M(2)/2)+.5))THEN365
355 COLOR1,0:FORI=1TO2:FORQ=0TO2
8STEP2:LINE(H(HH(I))+Q,V(VV(I))+
Q)-(H(HH(I))+58-Q,V(VV(I))+40-Q)
,PRESET,B:NEXTQ:LINE(H(HH(I))+Q-
8,V(VV(I))+Q)-(H(HH(I))+58-Q+8,V
(VV(I))+40-Q),PRESET,BF:NEXTI
360 FORQ=1TO2:DRAWK$(HH(Q),VV(Q)
)+"S4BR30BD14C1":DRAW PT$(PL):NE
XTQ:SC(PL)=SC(PL)+2:GOTO215
365 FORZ=1TO2:K(HH(Z),VV(Z),2)=0
:NEXTZ:COLOR1,0:FORI=1TO2:FORQ=0
TO20STEP2:LINE(H(HH(I))+Q,V(VV(I
))+Q)-(H(HH(I))+58-Q,V(VV(I))+40
-Q),PRESET,B:NEXTQ,I:GOTO215
370 FORI=1TO2000:NEXT
375 CLS:PRINT@104,"FINAL SCORECA
RD"
380 PRINT@168,"PLAYER ONE =";SC(
1)
385 PRINT@232,"PLAYER TWO =";SC(
2)
390 PRINT@296,"PLAYER ";:IFSC(1)
>SC(2)THENPRINT"ONE WINS!";ELSEI
FSC(2)>SC(1)THENPRINT"TWO WINS!"
395 IFSC(1)=SC(2)THENPRINT@296,"
THE GAME IS TIED!"
400 PRINT@360,"ANOTHER TRY (Y/N)
?";
405 X$=INKEY$:IFX$="Y"THENRUNELS
EIFX$="N"THENCLS:RUN"MENU":ELSE4
05
1000 REM ALABAMA
1010 DATA"BR40BD60U20M+4,-30R30M
+4,+40LD6L26D6L10"
1020 DATA"BR12BD40U12R8D6NL8D6BR
6NU12R6BR6U12R8D6NL8D6BR6R2U12NL
2R8D6NL8D6NL8BR6U12R8D6NL8D6BR6U
12R6ND12R6D12BR6U12R8D6NL8D6"
1030 REM ALASKA
1040 DATA"BR14BD64NU2R6U4NL6BR6N
U2R6U4NL6BR6NU2R6U4NL6BR6E6U2L12
H6U6E2R6E2U2H2L4U4E2R4F2E4H4U4R1
2U2R16D2R12D38R4F6R4F10D4L4H10L4
H6L6H6L8M-16,+10H2"
1050 DATA"BR22BD40U12R8D6NL8D6BR
6NU12R6BR6U12R8D6NL8D6BR6R8U6L8U
6R8BD12BR6U12D6R4NE6F6BR6U12R8D6
NL8D6"
1060 REM ARIZONA
1070 DATA"BR34BD50M+30,+12R22U54
L40D8L6G4D8F4G4D4F4G6"
1080 DATA"BR18BD40U12R8D6NL8D6BR
6U12R8D6L8R2F6BR6NU12BR6NR8M+8,-
12NL8BD12BR6U12R8D12NL8BR6U12M+8
,+12NU12BR6U12R8D6NL6D6"
1090 REM ARKANSAS
1100 DATA"BR34BD50F4R4D6R40U8M+1
0,-38L6U4L56M+4,+40
1110 DATA"BR8BD40U12R8D6NL8D6BR6
U12R8D6L8R2F6BR6U12D6R2NE6F6BR6U
12R8D6NL8D6BR6U12M+6,+12NU12BR6R
8U6L8U6R8BD12BR6U12R8D6NL8D6BR6R
8U6L8U6R8"
1120 REM CALIFORNIA
1130 DATA"BR68BD70NR22U6H10L4H10
U4H4R4U4L4H6U10H4E4U8R30D26F28D6
F2G2D6"
1140 DATA"BR14BD40L6U12R6BD12BR4
U12R8D6NL8D6BR6NU12R4BR6NU12BR4U
6NR6U6R8BD12BR4U12R6D12NL6BR6U12
R8D6L8R2F6BR6U12M+6,+12NU12BR6NU
12BR6U12R8D6NL8D6"
1150 REM COLORADO
1160 DATA"BR32BD52R60U40L60D40BE
26E4R6F4"
1170 DATA"BR14BD40L6U12R6BD12BR6
U12R8D12NL8BR6NU12R6BR6U12R8D12N
L8BR6U12R8D6L8R2F6BR6U12R8D6NL8D
6BR6R2U12L2R10D12NL8BR6U12R8D12L
8"
1180 REM CONNECTICUT
1190 DATA"BR28BD62M+20,-8R28E4R2
0E4U30L68D30F4M-16,+6D6R2"
1200 DATA"BR12BD40L6U12R6BD12BR4
U12R6D12NL6BR4U12M+8,+12NU12BR4U
12M+8,+12NU12BR4NR4U6NR4U6R4BD12
BR4NR6U12R6BR4R4ND12R4BR4D12BR4N
R6U12R6BR4D12R6U12BR4R4ND12R4"
1210 REM DELAWARE
1220 DATA"BR44BD62NR30U50E8R8F2D
4G6D12F6M+10,+26"
1230 DATA"BR6BD40R2NU12R8U12NL10
BR6NR6D6NR6D6R6BR6NU12R6BR6U12R8
D6NL8D6BR6NU12R6NU12R6NU12BR6U12
R8D6NL8D6BR6U12R8D6L8R2F6BR6NR6U
6NR6U6R6"
1240 REM FLORIDA
1250 DATA"BR20BD8R28F4R26F2R4U6R
10D10M+18,+30D16G4L12H8U4M-16,-9
U6E2U4H12L8G6L6H10L10U4H2U2"
1260 DATA"BR16BD40U6NR8U6R8BR6D1
2R6BR6U12R8D12NL8BR6U12R8D6L8R2F
6BR6U12BR6R2ND12R8D12NL10BR6U12R
8D6NL8D6"
1270 REM GEORGIA
1280 DATA"BR40BD56U20M-8,-30R36G
2F30D6L2D8F2D4L10D6L4U4L36H6"
1290 DATA"BR16BD40NR8U12R8BD6NL4
D6BR6NR8U6NR8U6R8BR6ND12R8D12NL8
BR6U12R8D6L8R2F6BR6NR8U12R8BD6NL
4D6BR6NU12BR6U12R8D6NL8D6"
1300 REM HAWAII
1310 DATA"BR12BD16NU4R6U4NL4BR8F
4R6E2U4H2L6G4D2BR16BD6R4E4R4F6D4
L12NH4BR20E2R8F2G2L8NH2BD6R4D4L4
U4BR10E4R4F4R6D4L12H4BD14BR8D4G4
D4R2D4F4R4E8R4E4U4H4L4H2L10"
1320 DATA"BR22BD40U12D6R8U6D12BR
6U12R8D6NL8D6BR6NU12R8NU12
```

```
BR6U12R8D6NL8D6BR8NU12BR8NU12"
1330 REM IDAHO
1340 DATA"BR44BD60R40U20L10U2H4U
2L4M-8,-22U6L12D30F4G8F2D10"
1350 DATA"BR28BD40NU12BR8R2U12L2
R10D12NL8BR6U12R8D6NL8D6BR6U12D6
R8U6D12BR6U12R8D12L8"
1360 REM ILLINOIS
1370 DATA"BR46BD6R30D6F2D30G2D4G
2D4G2L4D2F4D2L8H2L4G2L2H4U6H10U4
E2U2H6U2E6U4R6E4U4H4"
1380 DATA"BR16BD40NU12BR8NU12R6B
R6NU12R6BR8NU12BR8U12M+8,+12U12B
R6ND12R8D12NL8BR8NU12BR8R8U6L8U6
R8"
1390 REM INDIANA
1400 DATA"BR46BD8ND30R36D36F2D2G
6L4G8L2G4L4H4L2G6L2H4U6E2U4E4U8"
1410 DATA"BR16BD40NU12BR8U12M+8,
+12U12BR6R2ND12R8D12NL10BR8NU12B
R8U12R8D6NL8D6BR6U12M+8,+12NU12B
R6U12R8D6NL8D6"
1420 REM IOWA
1430 DATA"BR40BD18R42D2F4D4F6D6G
2L4D4G4D4L4H2L30H2U4H4U4H6U4E2U2
H6R8"
1440 DATA"BR32BD40NU12BR8U12R8D1
2NL8BR6NU12R6NU12R6NU12BR6U12R8D
6NL8D6"
1450 REM KANSAS
1460 DATA"BR32BD18R52D2F4D4F4D20
L60U32"
1470 DATA"BR20BD40U12D6R2NE6F6BR
6U12R8D6NL8D6BR6U12M+6,+12NU12BR
6R8U6L8U6R8BD12BR6U12R8D6NL8D6BR
6R8U6L8U6R8"
1480 REM KENTUCKY
1490 DATA"BR18BD48R80E4R2E4U2E4H
4L2H4U4H4L2G2L4H6L4U2L8D4G4L4G4L
8G4L4H4L4G8L4G4D2L4D4L4D6L2R8"
1500 DATA"BR10BD40U12D6R2NE6F6BR
6NR8U6NR8U6R8BR6ND12M+8,+12U12BR
4R4ND12R4BR4D12R8U12BR6NR8D12R8B
R6U12D6R2NF6E6BR6D2F4ND6E4NU2"
1510 REM LOUISIANA
1520 DATA"BR28BD10R40F4D2F4D2G4L
G8D6R26D4G2D2F4L10G2F2R8G4F4DL8H
6L4D6L8H4G4L2H2L2H6L8H2L8U6E2U6E
6U2H6U16
1530 DATA"BR10BD40NU12R6BR6U12R8
D12NL7BR6NU12R8NU12BR6NU12BR6R6U
6L6U6R6BR6D12BR6U12R8D6NL8D6BR6U
12M+8,+12U12BR6ND12R8D6NL8D6"
1540 REM MASSACHUSETTS
1550 DATA"BR24BD20R50E4R2E4R8F6D
4G6L4D4F8R2D6R10E2U6H4U4R6F4D16M
-22,+8U6L4G6L6H10U4L28D4L4U4L18H
2M+8,-22"
1560 DATA"BR8BD40U12R4ND12R4D12B
R4U12R4D6NL4D6BR4R4U6L4U6R4BR4NR
4D6R4D6NL4BR4U12R4D6NL4D6BR4NR4U
12R4BR4D12U6R4U6D12BR4NU12R4NU12
BR4R4U6L4U6R4BD12BR4NR2U6NR2U6R2
BR4R2ND12R2BR4R2ND12R2BR4NR4D6R4
D6L4"
1570 REM MARYLAND
1580 DATA"BR24BD20R70D24R12D8L4D
2L10H6U4H6U8E4U2L8D2G6D8F6D4L6H1
0U6H2L4H2U4L6G2L6U4L2G6L6U8"
1590 DATA"BR6BD40U12R6ND12R6D12B
R6U12R8D6NL8D6BR6U12R8D6L8R2F6BR
4BU12D2F4ND6E4U2BR6D12R6BR6U12R8
D6NL8D6BR6U12M+8,+12NU12BR4R2NU1
2R8U12L10"
1600 REM MAINE
1610 DATA"BR34BD36ND30R4E4U4E2M+
6,-20E4R6F6R8F6D20R4F2D6R4F4G6L8
G4L6G2L6G4L10G8H4"
1620 DATA"BR26BD40U12R6ND12R6D12
BR6U12R8D6NL8D6BR6NU12BR6U12M+8,
+12U12BR6NR8D6NR8D6R8"
1630 REM MICHIGAN
1640 DATA"BR48BD68R40M+12,-22U10
H2L8G6L4H2U4E4U4E2U4H2L4H6L4G6L2
G6L2G4D8F2D6F2D2F4D2G2D4G6BU58L6
H4L6U2E2L4G4L2G6D2R8F4R8F2E4R8E4
R10U4L6H2L6G4"
1650 DATA"BR12BD40U12R6ND12R6D12
BR6NU12BR6NR8U12R8BR6D12U6R8U6D1
2BR6NU12BR6NR8U12R8BD6NL4D6BR6U1
2R8D6NL8D6BR6U12M+8,+12U12"
1660 REM MINNESOTA
1670 DATA"BR40BD64R50U8H8L4U6H4U
2E4U8E8R2E2R4E2U4L8H2L4G2L4H2L10
G4L10H4L2U2L14D8F2D6F2D12F2D28R2
"
1680 DATA"BR6BD40U12R6ND12R6D12B
R6NU12BR6U12M+8,+12NU12BR6U12M+8
,+12U12BR6NR6D6NR6D6R6BR6R6U6L6U
6R6BR6D12R6U12NL6BR4R4ND12R4BR4N
D12R6D6NL6D6"
1690 REM MISSISSIPPI
1700 DATA"BR40BD60R22D4F4R6E2R6F
2R2U64H2L26G6D2G6D6G4D6F4D4G2D4G
2D4G2D6"
```

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```
1710 DATA"BR6BD40U12R6ND12R6D12B
R6NU12BR6R6U6L6U6R6BR4NR6D6R6D6N
L6BR6NU12BR6R6U6L6U6R6BR4NR6D6R6
D6NL6BR6NU12BR6U12R6D6NL6BR6ND6U
6R6D6NL6BR6U6D12"
1720 REM MISSOURI
1730 DATA"BR36BD60R54F4G4R12U12H
4U4H6U6E4U4H4L2H10U4H2U4L54F4D4F
4D8F4D32"
1740 DATA"BR14BD40U12R6ND12R6D12
BR6NU12BR6R8U6L8U6R8BR4NR8D6R8D6
NL8BR6U12R8D12NL8BR6NU12R8NU12BR
6U12R8D6L8R2F6BR6U12"
1750 REM MONTANA
1760 DATA"BR16BD14R92D38L50D6L4U
2L6G2L2H4L4U8L2G4L4U8H6U6H6U10"
1770 DATA"BR14BD40U12R6ND12R6D12
BR6U12R8D12NL8BR6U12M+8,+12U12BR
4R4ND12R4BR4ND12R8D6NL8D6BR6U12M
+8,+12U12BR6ND12R8D6NL8D6"
1780 REM N CAROLINA
1790 DATA"BR36BD18R72D4G2L4D4R8D
4G2L12F4R2D4G4L2G6L8H8L12H8L14G2
L28U2E4R4E6R4E8"
1800 DATA"BR12BD50NR8U12R8BR6ND1
2R8D6NL8D6BR6U12R8D6L8R2F6BR6U12
R8D12NL8BR6NU12R6BR6NU12BR6U12M+
8,+12U12BR6ND12R8D6NL8D6BU18BL18
U12D6L8U6D12BL8U12R4L8BL6BD12H6L
2R8U6L8D12BL6U12L8D12NR8BL6NU12M
-8,-12D12"
1810 REM N DAKOTA
1820 DATA"BR26BD18NR68D38R74U12H
2U6H2U6H2U6"
1830 DATA"BR20BD50R2NU12R8U12NL1
0BR6ND12R8D6NL8D6BR6U12D6R2NF6E6
BR6D12R8U12NL8BR4R4ND12R4BR4ND12
R8D6NL8D6BU18BL6U12D6L8U6D12BL8U
12R4L8BL6BD12H6L2R8U6L8D12BL6U12
L8D12NR8BL6NU12M-8,-12D12"
1840 REM NEBRASKA
1850 DATA"BR22BD18NR62D20R20D14R
60U8H2U6H2U6H6L4H4"
1860 DATA"BR8BD40U12M+8,+12U12BR
6NR8D6NR8D6R8BR4R2NU12R8U6NL8U6N
L10BR6ND12R8D6L8R2F6BR6U12R8D6NL
8D6BR6R6U6L6U6R6BR6D12U6R2NE6F6B
R6U12R8D6NL8D6"
1870 REM NEVADA
1880 DATA"BR36BD12R42D44L4G4D4H3
4U18"
1890 DATA"BR18BD40U12M+8,+12NU12
BR6NR8U6NR8U6R8BR6D8F4E4U8BR6ND1
2R8D6NL8D6BR4R4NU12R8U12NL10BR6N
D12R8D6NL8D6"
1900 REM NEW HAMPSHIRE
1910 DATA"BR40BD68R28E4R2E4R4E2U
4H4U2H4U42L2G4L4H2L4D4G2D12L4G4D
6G6D4G2D4G2D6G2D6F2"
1920 DATA"BR34BD32U12M+8,+12NU12
BR6NR8U6NR8U6R8BR6D12R8NU12R8U12
BD18BL72D12U6R6U6D12BR6U12R6D6NL
6D6BR6U12R6ND12R6D12BR6U12R8D6NL
8BF6R6U6L6U6R6BR6D12U6R6U6D12BR6
NU12BR6U12R8D6L8R2F6BR6NR6U6NR6U
6R6"
1930 REM NEW JERSEY
1940 DATA"BR56BD4M+20,+10D8G6D2F
4R2F4M-8,+24G4L4U6L8H8L2H4U4E6R2
E2U2H6U8R2U8E6"
1950 DATA"BR36BD32U12M+8,+12NU12
BR6NR8U6NR8U6R8BR6D12R8NU12R8U12
BD18BL62R8L4D12L4BR14NR8U6NR8U6R
8BR6ND12R8D6L8R2F6BR6R8U6L8U6R8B
R6NR8D6NR8D6R8BR6BU12D4F4ND4E4U4
"
1960 REM NEW MEXICO
1970 DATA"BR36BD14R54D40L44D8L10
U48"
1980 DATA"BR36BD32U12M+8,+12NU12
BR6NR8U6NR8U6R8BR6D12R8NU12R8U12
BD18BL62ND12R8ND12R8D12BR6NR8U6N
R8U6R8BR4F6NG6NF6E6BR6ND12BR6NR8
D12R8BR6NU12R8U12L8"
1990 REM NEW YORK
2000 DATA"BR78BD4R24D16L2D12R2D1
8L2D10G4L4M-22,-9H6L50U6E6R2E4U2
R4U2R10D2R16U2E4U2H4E10R4E2R4BD6
0BR22E2R4E2R8D6L8G2L8U4
2010 DATA"BR36BD32U12M+8,+12NU12
BR6NR8U6NR8U6R8BR6D12R8NU12R8U12
BD18BL46D4F4ND4E4U4BR6ND12R8D12N
L8BR6U12R8D6L8R2F6BR6U12D6R2NE6F
6"
2020 REM OHIO
2030 DATA"BR92BD14D26G4D2G4D2L4G
2D4L4G2D2L4H6L2G2L6G2L4H6L4H4U32
R4E4R4F8R16E4R4E4R4E2R6"
2040 DATA"BR36BD40U12R8D12NL8BR6
U12D6R8U6D12BR6NU12BR6U12R8D12L8
"
2050 REM OKLAHOMA
2060 DATA"BR96BD24D28L10H2L2G2L4
H2L4H4L6G2L4H2L8H2U16L24U6R78"
2070 DATA"BR6BD40U12R8D12NL8BR6U
12D6R2NE6F6BR6NU12R4BR6U12R8D6NL
8D6BR6U12D6R8U6D12BR6NR8U12R8D12
BR6U12R6ND12R6D12BR6U12R8D6NL8D6
"
2080 REM OREGON
2090 DATA"BR106BD14NH4M-6,+14F6D
28L80H4U8E4U34R14F2D6F2R12M+20,-
8R8E2R6E2R6"
2100 DATA"BR20BD40U12R8D12NL8BR6
U12R8D6L8R2F6BR6NR8U6NR8U6R8BR6N
R8D12R8U6NL2D6BR6NR8U12R8D12BR6U
12M+8,+12U12"
2110 REM PENNSYLVANIA
2120 DATA"BR20BD18E6R2D4R70F10D2
G4D2G4F8D4G6L4G4L74U40
2130 DATA"BR4BD40U12R6D6NL6BD6BR
4NR6U6NR6U6R6BR4ND12M+6,+12U12BR
4ND12M+6,+12U12BR4NR4D6R4D6NL4BR
8U6H4NU2F4E4U2BR4D12R4BR4BU12D8F
4E4U8BR4ND12R6D6NL6D6BR4U12M+6,+
12U12BR4D12BR4U12R6D6NL6D6"
2140 REM RHODE ISLAND
2150 DATA"BR46BD20ND30R26D8R2D6F
4R2F4D8G2L6U8H4L8D12L6G2L4G2L4U4
BR22U8R4D8L4"
2160 DATA"BR24BD32U12R8D6L8R2F6B
R6U12D6R8U6D12BR6U12R8D12NL8BR6R
2NU12R8U12NL10BR6NR8D6NR8D6R8BD1
8BL70NU12BR6R8U6L8U6R8BR6D12R8BR
6U12R8D6NL8D6BR8U12M+8,+12U12BR6
R2ND12R8D12L10"
2170 REM S CAROLINA
2180 DATA"BR36BD18E4R4E2R18F4R14
F12G12D2G8L2G4L4H4U2H4U2H8L2H8L4
H2L4U2E4R2"
2190 DATA"BR12BD50NR8U12R8BR6ND1
2R8D6NL8D6BR6U12R8D6L8R2F6BR6U12
R8D12NL8BR6NU12R6BR6NU12BR6U12M+
8,+12U12BR6ND12R8D6NL8D6BU18BL18
U12D6L8U6D12BL8U12R4L8BL6D12L8U1
2BL6D12L8U12NR8BL6L8D6R8D6L8"
2200 REM S DAKOTA
2210 DATA"BR26BD12NR68D38R64F4R2
F6U4H2U4E2U4H2U12H2U6H6E2"
2220 DATA"BR20BD50R2NU12R8U12NL1
0BR6ND12R8D6NL8D6BR6U12D6R2NF6E6
BR6D12R8U12NL8BR4R4ND12R4BR4ND12
R8D6NL8D6BU18BL8U12D6L8U6D12BL8U
12R4L8BL6D12L8U12BL6D12L8U12NR8B
L6L8D6R8D6L8"
2230 REM TENNESSEE
2240 DATA"BR26BD28R90G6L2G4L8G4L
2G6L66U4E2U6E4U4"
2250 DATA"BR10BD40U12L4R8BR4NR6D
6NR6D6R6BR6U12M+8,+12NU12BR6U12M
+8,+12U12BR6NR6D6NR6D6R6BR6R6U6L
6U6R6BR6NR6D6R6D6NL6BR6NR6U6NR6U
6R6BR6NR6D6NR6D6R6"
2260 REM TEXAS
2270 DATA"BR50BD4R12D14R4F2R4F6R
8E2R4F2R6F2D8F2D6G4L4G6L4G4D8L4H
4L6H6L2H4L2H6L4G6L2H2L4H10U2H4R2
8U30R4"
2280 DATA"BR28BD40U12L4R8BR4NR6D
6NR6D6R6BR6E6NH6NE6F6BR6U12R8D6N
L8D6BR6R8U6L8U6R8"
2290 REM UTAH
2300 DATA"BR40BD8R22D14R20D36L42
U50"
2310 DATA"BR32BD40NU12R8U12BR6R4
ND12R4BR6ND12R8D6NL8D6BR6U12D6R8
U6D12"
2320 REM VIRGINIA
2330 DATA"BR24BD48R88U4H4L2H4U4H
2M-12,-4U4H4L2H4L8G4L2G12L6G4L6H
4L4G6D2G10R10"
2340 DATA"BR18BD28D8F4E4U8BR6D12
BR6U12R8D6L8R2F6BR6NR8U12R8BD6NL
2D6BR6U12BR6ND12M+8,+12U12BR6D12
BR6U12R8D6NL8D6"
2350 REM VERMONT
2360 DATA"BR88BD4D4G2D12L4G4D6G6
D4G2D4G2D6G2D6L22U22L4U4E2U18M+6
,-14R38"
2370 DATA"BR12BD28D8F4E4U8BR6NR8
D6NR8D6R6BR6U12R8D6L8R2F6BR6U12R
6ND12R6D12BR6NR8U12R8D12BR6U12M+
8,+12U12BR4R4ND12R4"
2380 REM WASHINGTON
2390 DATA"BR36BD14R62D36L16M-40,
+6H2U4L8H2M-6,-20H6U2R8F4R4U2H2U
2H4R6"
2400 DATA"BR6BD28D12R6NU12R6U12B
R4ND12R6D6NL6D6BR4R4U6L4U6R4BR4D
12U6R6U6D12BR6NU12BR6U12M+8,+12N
U12BR4NR8U12R8BD6NL2D6BR4BU12R4N
D12R4BR4D12R6U12NL6BR4ND12M+8,+1
2U12"
2410 REM WISCONSIN
2420 DATA"BR42BD62R42U12E2U6E2U4
E2U4E2U4L2M-8,+12L2U8R2U6H4M-22,
-6L6U4L4D2L8D7G2L2G6D10F10D6F2D6
F4"
2430 DATA"BR8BD28D12R6NU12R6U12B
R6D12BR6R6U6L6U6R6BR6NR6D12R6BR6
NR8U12R8D12BR6U12M+8,+12U12BR6NR
6D6R6D6NL6BR6U12BR6ND12M+8,+12U1
2"
2440 REM WEST VIRGINIA
2450 DATA"BR56BD10D10R18D8R4E6R4
E2R6F4D4L6D2G4D2G6L4M-8,+12F2D4G
2L4G2L14H2L4H4L4H4L2H2U4H2U4E4U2
E4U2E6U2E6U2E4U2E4D4"
2460 DATA"BR18BD38D8F4E4U8BR6D12
BR6U12R8D6L8R2F6BR6NR8U12R8BD6NL
2D6BR6U12BR6ND12M+8,+12U12BR6D12
BR6U12R8D6NL8D6BU18BL66NU12R6NU1
2R6U12BR6NR8D6NR8D6R8BR6R8U6L8U6
R8BR4R4ND12R4"
2470 REM WYOMING
2480 DATA"BR34BD18R56D36L56U36BF
8F4R2U6L2G2"
2490 DATA"BR12BD28D12R6NU12R6U12
BR6D4F4ND4E4U4BR6D12R8U12NL8BR6N
D12R6ND12R6ND12BR6D12BR6U12M+8,+
12U12BR6NR8D12R8U6L2"
```

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By John Crawford

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Displaying Picture Files Using OS-9 Level II Graphics

Part III

by Tim Kientzle

Another look at data-compression techniques

With this third article in our series we continue last month's theme by looking at two very different, albeit very effective, compression methods. Unfortunately these methods are complex and BASIC09 programs to decode them would be long and slow-running. Because of this, the second part of this article addresses some changes and improvements to our VEF program. The compression methods discussed are those used by CM3 and GIF formats. They are a little tough to understand, so if you have difficulty, go to the second half and find out about the improvements made to the VEF viewer.

Non-RLE Compression

Last month several different variants of a compression method known as Run-Length Encoding (RLE) were discussed. This method is so named since it compresses files by encoding sequences of a single repeated byte, or run. Due to its simplicity, variations of RLE are very common. There are, of course, other methods. *CoCo Max III* has an interesting and effective compression method that encodes repeated bytes occurring either horizontally or vertically. By taking advantage of vertical and horizontal repetition, it can compress many graphics files significantly better than most of the RLE variants. The CompuServe Information Service (CIS) has standardized its Graphics Interchange Format (GIF) to allow many different types of computers to share picture files. This is done by storing detailed information about picture resolution and color mapping so that viewer programs can adapt the picture to whatever display hardware is available. GIF is also somewhat remarkable since it uses a sophisticated compression method known as Lempel-Ziv-Welch compression (LZW), so named after its three founders. LZW creates a table of common sequences of bytes and uses this table to encode the data. Since this method automatically adapts to any kind of data by generating this table from the specific data file, it is very effective at compressing many kinds of data.

Vertical and Horizontal Compression

CM3 format does several things to simplify programming, provide good compression and to avoid lengthening files. These will be discussed without much detail. CM3 compresses each line separately. Each line of the graphics data is stored with a header byte followed by the graphics data. This helps to simplify programming since each line can be handled separately. It also helps prevent the lengthening of files. If a line would be too long compressed, it can be stored uncompressed. This means that in the worst case only one byte would be added for each graphics line. The compression uses two arrays of bits that tell how to restore each byte on the line. A compressed line starts with an array of 160 bits (20

Tim Kientzle is currently pursuing a doctorate in mathematics at the University of California at Berkeley and has worked with the CoCo since 1982. He is best known in the CoCo world as the author of V-Term. He can be found on Delphi as TIMKIENTZLE. Or you can contact him at 14 Croxton Avenue, Oakland, CA 94611.

bytes), one bit for each byte of graphics data on this line. If the corresponding bit is zero, the previous byte is duplicated. If the bit is one, a bit is checked in a second array. If that bit is zero, the byte above is duplicated. Otherwise, a byte is copied from the data stored in this line. This requires only one bit if a byte duplicates the one before it, two bits if the the byte duplicates the one above it or 10 bits if the byte doesn't satisfy either of these. As long as there are a lot of bytes that are either horizontally or vertically duplicated, this will work well. But even if there aren't the line can always be stored uncompressed. For many files this might mean lines in the middle of a picture (where there is probably more detail) might be stored uncompressed, while lines at the top and bottom would be stored compressed.

Storing Patterns

The Lempel-Ziv-Welch compression method used by GIF is rapidly becoming an industry standard. The OS-9 archiving programs `ar` and `pak` use it, as do the MS-DOS programs ARC and ZOO, the Unix `compress` program and others. The method was originally described by the authors in a series of articles published in professional magazines. The full details of LZW compression can get complicated, but the basic idea is simple. The ideas behind LZW compression are described first, then we'll take a look at some other features of the GIF format.

If you think about it, the only way files can be compressed is to take advantage of repeated patterns in the data. For RLE, the kind of pattern exploited is a repeated single byte. For CM3, the patterns looked for are single bytes repeated either vertically or horizontally. In the case of LZW compression, the patterns compressed are determined from the data itself. An LZW encoder keeps a table of each sequence of bytes it sees, then uses the position in that table as a code for that sequence. As a rough example, if it read *abcdabc* it would first store the sequence *ab*, then the sequence *cd*. Next it would see *ab*, encode that using the code for *ab* and then store *abc* in the table. Each time it sees a sequence that extends an already known sequence, that sequence is added to the table. In this way it can adapt to almost any sort of data.

The only tricky part of this is that the encoder must make sure the decoder can figure out this mess. Citing from the above example, if we put *ab* in our table and then immediately used that code, the decoder would not know what the code stood for. Instead, the encoder will simply not use a code that has just been added to the table. This way the decoder can build its own table of codes and be assured that whenever it sees a code in the data, that code is already in its own table of sequences.

The strong point of GIF is its compression method. This method fulfills one of the two design goals of the format, which is to reduce file size for quick transmission between systems. The other goal is to allow picture reproduction on any system. For this reason GIF is careful to store the picture size and color information in a format that is easily interpreted on a wide variety of computers.

An obvious question to ask is that if GIF has such a great compression method, then why isn't it being used by everyone? There are two reasons for its lack of universal appeal. First of all, GIF is intended to allow picture files to be moved between many different types of computers. As a result it avoids storing information that might not be useful on some machines like animation information or pattern data. There is also a trade-off in complexity. GIF is much more complex than RLE approaches. GIF requires more data memory (the encode/decode tables require at least 16K), more program code and more time to encode or decode a file. For many program authors this is simply not worth the benefits.

More Level II Tips and Tricks

Let's think about ways to increase the speed of our VEF program. If you look at the VEF program, there are three major pieces of code. The first procedure reads and interprets the header. The second retrieves a line of graphics data from the file. The third procedure puts that line of graphics data on the screen. The header is read only once per picture and additional speed in this operation would not significantly effect the speed of the program. When retrieving a line of graphics data from the file, there are few ways faster than a Get of the entire line, which is used for uncompressed data. Last month a trick was shown using an OS-9 system call to get exactly one compressed packet. The reason Get can't be used to retrieve the entire packet is that the length of the packet is not known in advance. Get always reads exactly enough to fill the appropriate variable. The only part left to improve upon is the code to put a line of graphics on the screen.

You may recall in the first part of this

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series I mentioned two methods of putting the data on the screen. The first method was the one used in the PutLine procedure, the GPLoad escape sequence. This sequence causes the window system to store the following data into a Get/Put buffer, which can then be put directly on the screen. (This is the Put of a graphics image on the screen and not the BASIC09 PUT command to write a variable to a file.) The problem with this method is that OS-9 transfers the data from your program to the window system one byte at a time. It would be much faster to copy the data directly into the Get/Put buffer. An example of this can be seen in Listing 1. It uses a GetStat call to map the buffer so it can be accessed directly. This is faster than the GPLoad sequence originally used.

Don't spend a lot of time re-creating the buffer from scratch if it can be avoided. This process can be avoided with a new procedure to create and map-in the buffer, which is run near the beginning of VEF. To accommodate this, a few changes must be made to our main VEF procedure. These changes are included in the revised VEF procedure in Listing 1.

There is very little speed gained with this version since the PutLine routine has to copy the data byte-by-byte to the buffer. This process is just as slow as having the window system do it with GPLoad. To correct this have the GetLine routine put the line data directly into the buffer, which makes it unnecessary for us to copy the line data around. An example of this is in Listing 2. Since the required changes (removing the Line variable and using a variable to hold the address of the Get/Put buffer) affect nearly every procedure, a full listing has been included. This version is almost as fast when displaying uncompressed VEF pictures as programs written completely in C or assembly language. Speeding it up for

512K OS-9 Level II

Listing 1: SetBuffer.b09

```
PROCEDURE SetBuffer
 0000      (* Creates and maps in a Get/Put Buffer
 0027      TYPE Registers=CC,A,B,DP:BYTE; X,Y,U:INTEGER
 004C      TYPE ScrnType=sctype:INTEGER; bytes:INTEGER; width:INTEGER
 0063
 0064      PARAM scpath:BYTE
 006B      PARAM scrn:ScrnType
 0074      PARAM BufAddress:INTEGER
 007B      DIM Regs:Registers
 0084      DIM I:INTEGER
 008B      DIM null:BYTE
 0092
 0093      null=0
 009A      (* Do a GPLoad to create the buffer
 00BD      RUN GFX2(scpath,"gpload",1,1,scrn.sctype,scrn.width,1,scrn.bytes)
 00F1      FOR I=0 TO 159
 0101        PUT #scpath,null
 010B      NEXT I
 0116
 0117      Regs.A=scpath \Regs.B=$84 \Regs.X=$0101 \Regs.Y=1
 0146      RUN SysCall($8E,Regs) \(* Now, get access to it
 016C
 016D      BufAddress=Regs.X \(* The rest of the program needs this value
 01A3      END

PROCEDURE PutLine
 0000      (* Assumes we have a previously mapped-in Buffer
 0030      (*
 0033      BASE 0
 0035      TYPE LineType=long(160):BYTE; short(80):BYTE
 0050      TYPE ScrnType=sctype:INTEGER; bytes:INTEGER; width:INTEGER
 0067
 0068      PARAM scpath:BYTE
 006F      PARAM scrn:ScrnType
 0078      PARAM linenum:INTEGER
 007F      PARAM line:LineType
 0088      PARAM BufAddress:INTEGER \(* NOTE! New Parameter... remember to change VEF!
 00C0
 00C1      DIM I:INTEGER
 00C8
 00C9      IF scrn.bytes>80 THEN  \(* Copy line.long into buffer
 00F5        FOR I=0 TO 159
 0105          POKE BufAddress+I,line.long(I)
 0118        NEXT I
 0123      ELSE  \(* Copy line.short into buffer
 0145        FOR I=0 TO 79
 0155          POKE BufAddress+I,line.short(I)
 0168        NEXT I
 0173      ENDIF
 0175
 0176      RUN GFX2(scpath,"Put",1,1,0,linenum)
 0194      END

PROCEDURE VEF
 0000      (* Display a VEF format picture file on a window screen
 0037      PARAM Filename:STRING
 003E      BASE 0
 0040
 0041      (* Stores info about the screen we're using
 006C      (* sctype=OS9 screen type; bytes=bytes/line; width = pixels/line
 00AC      TYPE ScrnType=sctype:INTEGER; bytes:INTEGER; width:INTEGER
 00C3
 00C4      (* Since there are two different sizes of lines, we create a structure
 010A      (* with two different-sized arrays, so we can use fast GET and PUT
```

```
014C      (* commands for I/O.
0160      TYPE LineType=long(160):BYTE; short(80):BYTE
017B
017C      DIM palette(16):BYTE
0188      DIM compress:INTEGER
018F      DIM line:LineType
0198      DIM scrn:ScrnType
01A1      DIM path,scpath:BYTE
01AC      DIM i:INTEGER
01B3      DIM char:BYTE
01BA      DIM buffer:INTEGER
01C1
01C2      (* First, open the file
01D9      OPEN #path,Filename:READ
01E5
01E6      (* Get the header information
0203      RUN GetHeader(path,scrn.sctype,palette,compress)
021F      (* Create the screen and set up "scrn" structure.
0250      RUN SetScreen(scpath,scrn)
025F      RUN SetBuffer(scpath,scrn,buffer)
0273
0274      FOR i=0 TO 15 \(* Set the palettes
0297        RUN GFX2(scpath,"Palette",i,palette(i))
02B8      NEXT i
02C3
02C4      FOR i=1 TO 8 \(* VEF convention is to skip top 8 lines
02FC        RUN GetLine(path,scrn.bytes,compress,line)
0318      NEXT i
0323      FOR i=0 TO 191 \(* Load and display each line
0350        RUN GetLine(path,scrn.bytes,compress,line)
036C        RUN PutLine(scpath,scrn,i,line,buffer)
038A      NEXT i
0395
0396      RUN GFX2("Bell") \(* Tell the user we're done
03BD      GET #scpath,char \(* Wait for a key press
03DE      RUN GFX2("KillBuff",1,1) \(* Kill the buffer we used
040E      RUN GFX2("Select") \(* Select the screen where we started
0441      CLOSE #path \(* close the disk file
045D      IF scpath>2 THEN  \(* If it's not StdI/O, close the screen
0490        CLOSE #scpath
0496      ENDIF
0498      END
```

compressed pictures would require rewriting the UnSquash routine in C or assembly.

Project Ideas

Once you understand the VEF program and the changes made to it, there are several other programs to try.

Change the final version of the VEF program to handle MGE format pictures.

If you know C or assembly, rewrite the VEF program in either of these languages. At the very least, rewrite the UnSquash procedure. You might even try finding a good description of the CM3 format and writing a display program for that.

Saving a graphics screen can be done in essentially the same way. The only difference is that you use the GetBlk operation to get a line of graphics into a buffer, map in the buffer and then output the data. You will have to work around a minor bug that prevents the GetBlk operation from working on the full width of the screen. (You'll have to get only 1/2 of the line at a time.)

If you have access to information on other graphics formats, compare it to those discussed here. In particular, try to figure out how the compression method works and whether or not it would work better than any of these.

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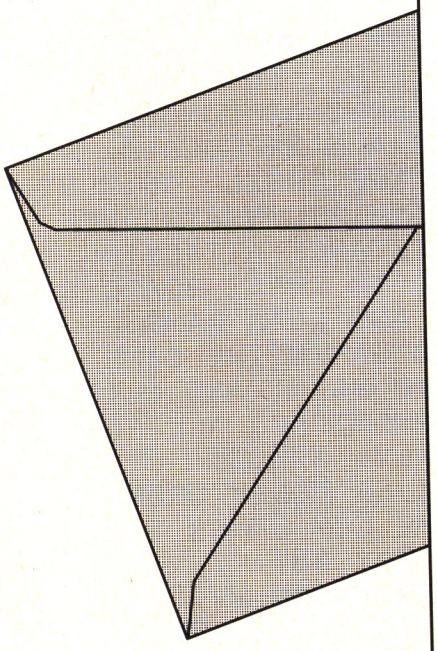


Listing 2: VEF.b09

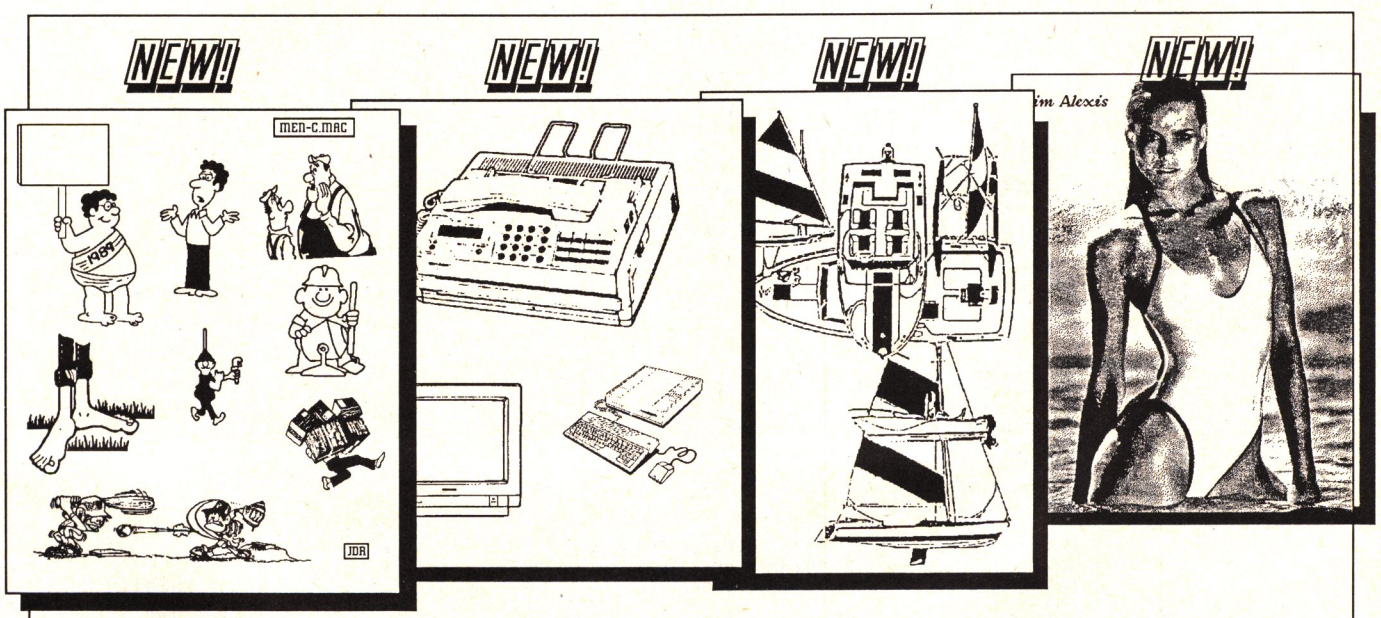
```
PROCEDURE VEF
 0000       (* Display a VEF format picture file on a window screen
 0037       PARAM Filename:STRING
 003E
 003F       BASE 0
 0041       (* Stores info about the screen we're using
 006C       (* sctype=OS9 screen type; bytes=bytes/line; width = pixels/line
 00AC       TYPE ScrnType=sctype:INTEGER; bytes:INTEGER; width:INTEGER
 00C3
 00C4       DIM palette(16):BYTE
 00D0       DIM compress:INTEGER
 00D7       DIM scrn:ScrnType
 00E0       DIM path,scpath:BYTE
 00EB       DIM i:INTEGER
 00F2       DIM char:BYTE
 00F9       DIM buffer:INTEGER
 0100
 0101       (* First, open the file
 0118       OPEN #path,Filename:READ
 0124
 0125       (* Get the header information
 0142       RUN GetHeader(path,scrn.sctype,palette,compress)
 015E       (* Create the screen and set up "scrn" structure.
 018F       RUN SetScreen(scpath,scrn)
 019E       RUN SetBuffer(scpath,scrn,buffer) \(* Create and map in G/P Buffer
 01D1
 01D2       FOR i=0 TO 15 \(* Set the palettes
 01F5         RUN GFX2(scpath,"Palette",i,palette(i))
 0216       NEXT i
 0221
 0222       FOR i=1 TO 8 \(* VEF convention is to skip top 8 lines
 025A         RUN GetLine(path,scrn.bytes,compress,buffer)
 0276       NEXT i
 0281       FOR i=0 TO 191 \(* Load and display each line
 02AE         RUN GetLine(path,scrn.bytes,compress,buffer)
 02CA         RUN PutLine(scpath,i)
 02D9       NEXT i
 02E4
 02E5       RUN GFX2("Bell") \(* Tell the user we're done
 030C       GET #scpath,char \(* Wait for a key press
 032D       RUN GFX2("KillBuff",1,1) \(* Kill the buffer we used
 035D       RUN GFX2("Select") \(* Select the screen where we started
 0390       CLOSE #path \(* close the disk file
 03AC       IF scpath>2 THEN  \(* If it's not StdI/O, close the screen
 03DF         CLOSE #scpath
 03E5       ENDIF
 03E7       END

PROCEDURE GetHeader
 0000       (* Read header info from "path", return window type, palettes,
 003E       (* and compression code.
 0056       PARAM path:BYTE
 005D       PARAM wintype:INTEGER
 0064       PARAM palette(16):BYTE
 0070       PARAM compress:INTEGER
 0077
 0078       (* Stores all the info in a VEF header in one variable
 00AE       TYPE VEFheader=comp:BYTE; VEFtype:BYTE; pals(16):BYTE
 00CA       DIM header:VEFheader
 00D3
 00D4       GET #path,header \(* Actually read the header info from path.
 0109
 010A       compress=header.comp \(* Set compression type
 012C       palette=header.pals \(* Set palettes
 0146      wintype=8-header.VEFtype \(* Convert VEF picture type into window type
 0180       IF wintype<7 THEN
 018C         wintype=wintype+1
 0197       ENDIF
 0199       END

PROCEDURE SetScreen
 0000       (* Creates the screen, and sets the "scrn" variable
 0033       TYPE ScrnType=sctype:INTEGER; bytes:INTEGER; width:INTEGER
 004A       PARAM scpath:BYTE
 0051       PARAM scrn:ScrnType
 005A
 005B       DIM scrncode(14):BYTE
 0067       DIM i:INTEGER
 006E       FOR i=1 TO 14
 007E         READ scrncode(i)
 0087       NEXT i
 0092      (* This is the "magic" sequence that will set up the new screen right.
 00D8       (* It has the codes for DWSet, Select, CurOff
 0105       DATA $1B,$20,$08,$00,$00,$28,$18,$00,$01,$00,$1B,$21,$05,$20
 0141
 0142       scrn.width=320 \(* Width is the width of the screen in pixels
```

```
017B        IF scrn.sctype=5 OR scrn.sctype=7 THEN
0194          scrn.width=640
01A0        ENDIF
01A2
01A3        scrn.bytes=160 \(* Linesize is number of bytes per line.
01D6        IF scrn.sctype=5 OR scrn.sctype=6 THEN
01EF          scrn.bytes=80
01FA        ENDIF
01FC
01FD        OPEN #scpath,"/w":UPDATE \(* Create a new window
0220        (* scpath = 1 \ RUN GFX2(scpath,"DWEnd") \ (* Use the same window
0261
0262        RUN GFX2(1,"Select") \(* Select our StdOut screen
028E
028F        scrncode(3)=scrn.sctype \(* Byte 3 is the screen type
02B9        scrncode(6)=scrn.width/8 \(* Byte 6 is the screen width in characters
02F5        PUT #scpath,scrncode
02FF        END

PROCEDURE SetBuffer
0000        (* Creates and maps in a Get/Put Buffer
0027        TYPE Registers=CC,A,B,DP:BYTE; X,Y,U:INTEGER
004C        TYPE ScrnType=sctype:INTEGER; bytes:INTEGER; width:INTEGER
0063
0064        PARAM scpath:BYTE
006B        PARAM scrn:ScrnType
0074        PARAM BufAddress:INTEGER
007B        DIM Regs:Registers
0084        DIM I:INTEGER
008B        DIM null:BYTE
0092
0093        null=0
009A        (* Do a GPLoad to create the buffer
00BD        RUN GFX2(scpath,"gpload",1,1,scrn.sctype,scrn.width,1,scrn.bytes)
00F1        FOR I=0 TO 159
0101          PUT #scpath,null
010B        NEXT I
0116
0117        Regs.A=scpath \Regs.B=$84 \Regs.X=$0101 \Regs.Y=1
0146        RUN SysCall($8E,Regs) \(* Now, get access to it
016C
016D        BufAddress=Regs.X \(* The rest of the program needs this value
01A3        END
```

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```
PROCEDURE PutLine
 0000      (* Assumes we have a previously mapped-in G/P Buffer, and that line data
 0048      (* is already in the G/P Buffer
 0067      PARAM scpath:BYTE
 006E      PARAM linenum:INTEGER
 0075
 0076      RUN GFX2(scpath,"Put",1,1,0,linenum)
 0094      END

PROCEDURE GetLine
 0000      (* Gets one line of graphics data from the file into the buffer
 003F      (* "bytes" is the length of the line expected, "compress"
 0078      (* is the compression format
 0094      PARAM path:BYTE
 009B      PARAM bytes:INTEGER
 00A2      PARAM compress:INTEGER
 00A9      PARAM buffer:INTEGER \(* Address of mapped-in buffer
 00CE
 00CF      DIM scratch(300):BYTE
 00DB
 00DC      IF compress=0 THEN  \(* 0 means no compression
 0101        RUN I_Read(path,buffer,bytes)
 0115      ELSE  \(* compress is not zero
 0130        RUN GetPacket(path,scratch)
 013F        RUN UnSquash(scratch,buffer,bytes/2)
 0155        RUN GetPacket(path,scratch)
 0164        RUN UnSquash(scratch,buffer+bytes/2,bytes/2)
 0180      ENDIF
 0182      END

PROCEDURE UnSquash
 0000      (* UnSquash data in scratch into memory (into G/P Buffer)
 0039      PARAM scratch(300):BYTE \(* Data to unsquash
 0058      PARAM target:INTEGER \(* Address to put result
 0077      PARAM targsize:INTEGER \(* size of result
 008F
 0090      DIM scrpos,linestop:INTEGER
 009B      DIM i,runend:INTEGER
 00A6      DIM temp:BYTE
 00AD
 00AE      scrpos=0 \linestop=target+targsize \i=target
 00C9      WHILE i<linestop DO  \(* Keep going until we get to the stopping point
 0106        scrpos=scrpos+1
 0111        runend=i+LAND(scratch(scrpos),127)-1 \(* Find where this group will end
 0147        IF runend>linestop THEN  \(* Some Squashed VEF files have problems...
 017F          runend=linestop
 0187        ENDIF
 0189        IF scratch(scrpos)>127 THEN  \(* If high bit set,
 01AB          temp=scratch(scrpos+1)
 01B9          scrpos=scrpos+1
 01C4          FOR i=i TO runend
 01D6            POKE i,temp \(* Repeat this value.
 01F4          NEXT i
 01FF        ELSE
 0203          FOR i=i TO runend \(* Otherwise,
 0222            scrpos=scrpos+1
 022D            POKE i,scratch(scrpos) \(* copy data straight.
 024F          NEXT i
 025A        ENDIF
 025C      ENDWHILE
 0260
 0261      END

PROCEDURE GetPacket
 0000      (* Gets one Squashed packet from the input path
 002F      (* Uses the I$Read system call to read the entire packet
 0067      (* at once, which is much faster.
 0088      PARAM path:BYTE
 008F      PARAM scratch(300):BYTE
 009B      DIM packsize:BYTE
 00A2      DIM Ipacksize:INTEGER
 00A9
 00AA      GET #path,packsize \(* Get 1-byte packet size
 00CD      Ipacksize=packsize \(* Make it an integer
 00EA      RUN I_Read(path,ADDR(scratch),Ipacksize)
 00FF      END

PROCEDURE I_Read
 0000      (* Call the I$Read system call
 001E      TYPE Registers=CC,A,B,DP:BYTE; X,Y,U:INTEGER
 0043      PARAM path:BYTE
 004A      PARAM bufaddr:INTEGER
 0051      PARAM bufsize:INTEGER
 0058      DIM regs:Registers
 0061
 0062      regs.A=path \(* A register holds the path
 008A      regs.X=bufaddr \(* X register holds the buffer address
 00BC      regs.Y=bufsize \(* Y register holds the size
 00E4      RUN SysCall($89,regs) \(* Read data into buffer
 010A      END
```

Ringing the ALARM

A look at sounding the alarm under OS-9

by David P. Boynton

Very few people know much about the OS-9 F$Alarm (callcode $1E) system call due to its lack of documentation by Tandy in the Technical Reference section of the Level II manual. When I first learned to use syscall under BASIC09, I thought it would be neat to set an alarm. So I gave it the address of a time packet and had no success. I then tried using the other registers, but still had no luck. After a while I completely forgot about it. Then one day I bought *Inside OS-9 Level II* from Frank Hogg Laboratories

David P. Boynton is a sophomore at Sunnyslope High School and has worked for two years in computer maintenance at a local newspaper. In his spare time David enjoys football, wrestling and computer programming. He can be contacted at 8827 N. 35th Dr., Phoenix, AR 85051.

OS-9 Level II

The Listing: alarm.b09

```
PROCEDURE alarm
 0000       (* Alarm    Version 1.00.00 *)
 001E       (* By David Boynton *)
 0034       TYPE Time_Packet=Year,Month,Day,Hour,Minute:BYTE
 004F       TYPE Registers=CC,A,B,DP:BYTE; X,Y,U:INTEGER
 0074       DIM TP:Time_Packet
 007D       DIM Regs:Registers
 0086       DIM CHAR:STRING[1]
 0092       (* Get function from command line *)
 00B6       PARAM Function:STRING[1]
 00C2       (* Set error trap *)
 00D6       ON ERROR GOTO 100
 00DC       (* Make sure function is from 1 to 4 *)
 0103       IF VAL(Function)<1 OR VAL(Function)>4 THEN 100
 011D       IF Function="4" THEN
 012A         (* Clear *)
 0135         PRINT "Clear Setting."
 0147         PRINT "Are you sure [Y/N]: ";
 0160         CHAR=""
 0167         WHILE CHAR="" DO
 0173           RUN inkey(CHAR)
```

Figure 1: Conditions for F$Alarm

Clear Alarm
Entry conditions:
A=0
B=0

Exit Conditions: None

Set Audio Alarm
Entry Conditions:
A=0
B=1
X=address of the 5-byte time packet

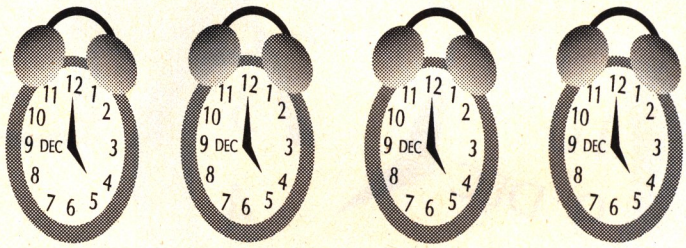
Exit Conditions: None

Set Signal Alarm
Entry Conditions:
A=Proc ID
B=signal to be sent
X=address of time packet

Exit Conditions: None

Get Alarm Status
Entry Conditions:
A=0
B=2
X=pointer to 5-byte buffer for packet return

Exit Conditions:
If A=0 and B=0, then the alarm was cleared.
If A=0 and B=1, then an audio alarm is set.
If A=255 and B=255, the alarm has already gone off.
Otherwise, the alarm is a signal alarm, and
A=Proc ID and B=Signal



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Corrections

"Wishing Well" (August 1990, Page 30): The line numbers to be changed in the listing for EZTHEL0 (from July 1990) to create EZTHEL02 are incorrect. The correct lines are 2, 25, 60, 65, 70, 71, 72, 74, 75, 76, 86, 87, 255, 301, 996, and 997.

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```
017D        ENDWHILE
0181        IF CHAR="y" OR CHAR="Y" THEN
0196          Regs.A=0
01A1          Regs.B=0
01AC          RUN syscall($1E,Regs)
01BA          PRINT
01BC          PRINT "Setting Cleared."
01D0        ENDIF
01D2        END
01D4      ENDIF
01D6      IF Function="3" THEN
01E3        (* Get Setting *)
01F4        Regs.A=0
01FF        Regs.B=2
020A        Regs.X=ADDR(TP)
0218        RUN syscall($1E,Regs)
0226        IF Regs.A=0 AND Regs.B=0 THEN
023F          PRINT "Alarm has been cleared."
025A          END
025C        ENDIF
025E        PRINT "Current alarm setting: "; STR$(TP.Year); "/"; STR$
             (TP.Month); "/"; STR$(TP.Day); " "; STR$(TP.Hour); ":"
             ; STR$(TP.Minute)
02B1        IF Regs.A=0 AND Regs.B=1 THEN
02CA          PRINT "Mode: Audio"
02D9        ENDIF
02DB        IF Regs.A>0 AND Regs.A<255 THEN
02F4          PRINT "Print process "; STR$(Regs.A); " will get signal "
                ; STR$(Regs.B); " at alarm."
0337        ENDIF
0339        IF Regs.A=255 THEN
0348          PRINT "Alarm has already sounded."
0366        ENDIF
0368        END
036A      ENDIF
036C      (* Get date from command line *)
038C      PARAM Dat:STRING[8]
0398      (* Get time from command line *)
03B8      PARAM Time:STRING[5]
03C4      IF Function="1" THEN
03D1        (* Set an audio alarm *)
03E9        TP.Year=VAL(LEFT$(Dat,2))
03FA        TP.Month=VAL(MID$(Dat,4,2))
040D        TP.Day=VAL(RIGHT$(Dat,2))
041E        TP.Hour=VAL(LEFT$(Time,2))
042F        TP.Minute=VAL(RIGHT$(Time,2))
0440        Regs.A=0
044B        Regs.B=1
0456        Regs.X=ADDR(TP)
0464        RUN syscall($1E,Regs)
0472        PRINT "Audio alarm set."
0486        END
0488      ENDIF
048A      (* Get Proc Id & Signal from command line *)
04B6      PARAM Id,Sig:STRING[3]
04C6      IF Function="2" THEN
04D3        (* Set a signal alarm *)
04EB        Regs.A=VAL(Id)
04F9        Regs.B=VAL(Sig)
0507        TP.Year=VAL(LEFT$(Dat,2))
0518        TP.Month=VAL(MID$(Dat,4,2))
052B        TP.Day=VAL(RIGHT$(Dat,2))
053C        TP.Hour=VAL(LEFT$(Time,2))
054D        TP.Minute=VAL(RIGHT$(Time,2))
055E        Regs.X=ADDR(TP)
056C        RUN syscall($1E,Regs)
057A        PRINT "Signal alarm set."
058F        END
0591      ENDIF
0593 100  (* Error routine *)
05A9    PRINT "Use: ALARM <Function> [Date] [Time] [Process Id] [Signal]"
05E6      PRINT "Functions:"
05F4      PRINT "             1 - Set an audio alarm"
061A      PRINT "             2 - Set a signal alarm"
0640      PRINT "             3 - Get current setting"
0667      PRINT "             4 - Clear setting"
0688    PRINT  \ PRINT "All dates and times MUST be padded with zeros."
06BC      END
```

and read the "Bugs" section of the book. This section told me more about the alarm call. I began to experiment with this call and discovered its usefulness.

The alarm call has four different functions. The call sets the alarm (actually the CC3IO module) to make a tone once per second for a duration of 15 seconds. It also sets the alarm for clock to send a process signal on time match, gets the alarm status and clears the alarm.

To tell the clock which function you want, set the A and B registers upon entry to the call. The entry conditions for the call are shown in Figure 1.

I have written a short BASIC09 procedure named *Alarm* to demonstrate the alarm's functions. This procedure was written as a command line utility and as such all input is given on the command line. It will not prompt you for anything except to clear the alarm. The command syntax is as follows:

```
alarm <Function> [Date] [Time]
[Procid] [Signal]
```

The functions are:

1 — set audio alarm
2 — set signal alarm
3 — get alarm status
4 — clear alarm

The date and time must be padded with zeros for the procedure to be read properly. syscall and inkey must also be in memory or in the current execution directory. For example, if you want to set an audio alarm for August 8, 1990, at 5:30 p.m., enter:

```
alarm 1 90/08/08 17:30
```

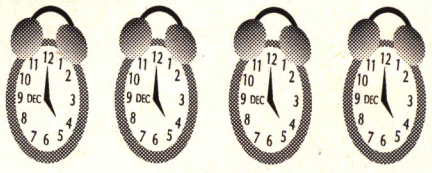
If you use the standard shell supplied by Tandy, enclose all the parameters in parenthesis and quotes as follows:

```
alarm("1","90/08/08","17:30")
```

Since I use *ShellPlus*, this is done for me. You can find *ShellPlus* on Delphi or just about any CoCo BBS.

To get the status and clear the alarm, the only parameter is the proper function. For example, to get the status, enter alarm 3.

I hope this was informative and you will find many uses for the call. Have fun with the program.



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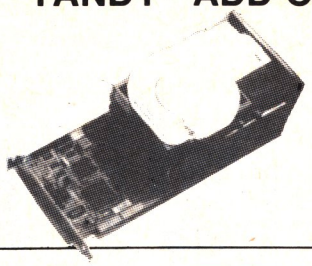

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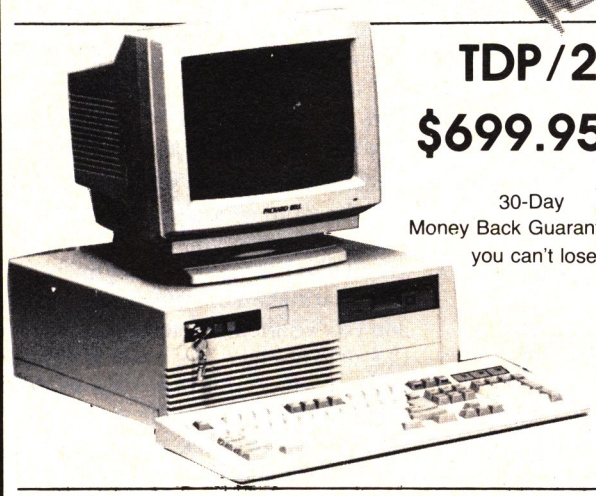

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BLETTER

BY JOEL MATHEW HEGBERG

Add-on is a word game plus a whole lot more. It is similar to a popular board game but has a few differences in scoring. To play this game you must have a CoCo 3 with a joystick or mouse plugged into the right joystick port. You can use a composite monitor, RGB monitor or a television set. Since this program uses the high resolution screen of the CoCo 3, an RGB monitor works best. I've also kept television users in mind by not using the first few columns of the screen since these cannot be seen when using a TV set.

The object of *Add-on* is to create as many words as possible while gaining the most points. Points are awarded for each letter in the words you create. You only get points for the word that you create. For example, if you create the word 'mob' (see Figure 1) you will have indirectly created the words 'not', 'be' and 'farms.' You will only get points for the word 'mob.'

Also on the grid are some colored squares. The dark red squares multiply the score of the word you create by three. The orange squares multiply the score by two. The dark blue squares multiply the score for the letter that occupies that square by three and the light blue squares multiply it by two.

Words are created from the letters on the grid. To begin the game, the computer randomly selects a starting word. New words must originate from one of the words already on the grid. To start a game, players must first select their tiles. These tiles are turned over to keep you from knowing the letters you have. Next, a grid appears on the screen and the first player's tiles are displayed face up. That player should study both his letters and the words on the grid. When a word is chosen, the player enters it via the keyboard. Using the joystick/mouse, move the cursor to the square where your word should begin and click the button. Push the arrow key to show in which direction the word should go (downward or to the right). If everything is done correctly, your word is placed on the grid.

If you make a mistake typing your word and you've already entered it, simply press CLEAR to re-enter your word. If you cannot make a word, you may pass to the next player without receiving any points. To pass your turn, click the joystick/mouse when you would normally be entering your word.

For the most part, any instructions needed are given onscreen. The * tile is a wild card letter. It isn't worth any points, but can be good to have. To create a word with this wild card, the player must include the * within the word. For example, you might enter *prin*er* for the word *printer*.

Figure 1: Word Creation

The game ends at player discretion. This could be when you have run out of tiles or you cannot make any more words with your current letter tiles. If you are in a multi-player game, the rule for when a game ends should be mutually agreed upon prior to play. To end the game, press BREAK.

At the beginning of this article I said "a word game plus a whole lot more." By this I mean the extensive point and click system used in this program. I designed this pro-

Joel Mathew Hegberg has been programming for seven years. He enjoys creating games and utilities for the Color Computer. In his spare time he teaches others how to use computers. For further information on this program contact Joel at 936 N. 12th St., Dekalb, IL 60115.

gram to give the player more control over what happens in the game.

When you first run the program, a blue screen appears with CMP on one side and RGB on the other. Simply point to the side for your monitor (television sets use CMP colors) and click the joystick/mouse button. These are the default colors. You may change or edit these by clicking on the Colors menu selection. To change a color, simply point to the box containing the color and hold down the joystick/mouse button. Quickly clicking the button changes the colors one at a time. Clicking the word Border changes the border color. If you make a mistake and/or want the default colors, simply click on the word CMP or the word RGB.

You can return to the main menu at any time by pressing BREAK. Doing this in the middle of a game causes your final scores to be displayed until you click the joystick/mouse button. To return to BASIC, simply click on the BASIC menu selection.

Have fun and enjoy! Please feel free to contact me if you have any questions or comments about this program. Click on the About Add-on menu selection. After my name and address are displayed, click the mouse/joystick button to see the values for each letter used in the program. ❑

CoCo 3

```
110 ..... 217
220 ..... 159
290 ..... 192
360 ..... 102
470 ..... 231
600 ..... 107
650 ..... 130
700 ..... 135
780 ..... 177
850 ..... 176
950 ..... 46
1000 ..... 88
1090 ..... 231
1150 ..... 232
1220 ..... 238
1290 ..... 89
1370 ..... 30
1460 ..... 241
1570 ..... 91
1650 ..... 115
1720 ..... 169
END ..... 115
```

The Listing: ADD-ON

```
0 'COPYRIGHT 1990 FALSOFT, INC.
10 '
20 '
30 'ADD-ON WORD GAME
40 '(C) MARCH 28, 1989 BY
50 'JOEL MATHEW HEGBERG
60 '936 NORTH TWELFTH STREET
70 'DE KALB, ILLINOIS  60115
80 '
90 '
100 POKE65496,0:WIDTH32:CLS:PMOD
E0,1:PCLEAR2:PCLS:SCREEN0,0:HSCR
EEN0:CLEAR7600:DIMPL$(4),ZZ$(100
),GB$(15,15),SC(4):HBUFF1,500:BD
=0:POKE&HFF9A,BD
110 POKE65497,0:CLS:R=RND(-TIMER
):HCOLOR4,2:HSCREEN2:HLINE(160,0
)-(160,191),PSET:HPRINT(9,11),"C
MP":HPRINT(29,11),"RGB"
120 IFBUTTON(0)<>0THEN120
130 GOSUB1740:GOSUB1780:GOSUB183
0:IFBUTTON(0)=0THEN130
140 IFPX<160THENCMP:ELSERGB
150 '
160 'DATA FOR LETTER DISTRIBUTIO
N
170 '
180 DATA A,8,B,3,C,3,D,3,E,11,F,
3,G,2,H,3,I,8,J,2,K,1,L,5,M,2,N,
5,O,7,P,3,Q,1,R,5,S,5,T,6,U,3,V,
2,W,3,X,1,Y,2,Z,1
190 '
200 'DATA FOR LETTER VALUES
210 '
220 DATA 1,3,3,4,1,5,6,5,1,8,7,5
,6,6,1,3,9,4,3,4,1,8,7,9,6,9,0
230 '
```


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```
240 'DATA FOR STARTING WORDS
250 '
260 DATA 15,COMPUTER,PRINTER,TAN
DY,RAINBOW,DISKETTE,MONITOR,JOYS
TICK,CARTRIDGE,KEYBOARD,KILOBYTE
S,CASSETTE,MOUSE,INTERFACE,BAUDR
ATE,BASIC
270 GOTO1140
280 POKE65497,0:HCOLOR8,0:HCLS:L
N=0:A$="PLEASE WAIT...":GOSUB134
0:RESTORE:FORX=1TO15:FORY=1TO15:
GB$(X,Y)="":NEXTY,X:FORT=1TO100:
ZZ$(T)="":NEXTT
290 FORT=1TO26:READ A$,A:FORB=1T
O A:GOSUB1740:GOSUB1780
300 X=RND(100):IFZZ$(X)<>""THEN3
00
310 ZZ$(X)=A$:GOSUB1830:NEXTB,T:
FORT=1TO100:IFZZ$(T)=""THEN ZZ$(
T)="*":NEXTT:ELSENEXTT
320 IFINKEY$<>""THEN320
330 NP=1:FORT=1TO27:READA:POKE40
00+T,A:NEXTT:HCLS:LN=0:A$="HOW M
ANY PLAYERS?":GOSUB1340:HPRINT(1
0,5),"1 PLAYER":HPRINT(30,5),"2
PLAYERS":HPRINT(10,10),"3 PLAYER
S":HPRINT(30,10),"4 PLAYERS"
340 IFBUTTON(0)<>0THEN340
350 GOSUB1740:GOSUB1780:GOSUB183
0:IFBUTTON(0)<>1THEN350
360 IFPY<40OR PY>87OR PX<80OR PX
>311THENSOUND1,1:GOTO350
370 IFPY<48THEN390:ELSEIFPY>79TH
EN NP=NP+2:GOTO390
380 SOUND1,1:GOTO350
390 IFPX<152THEN410:ELSEIFPX>239
THEN NP=NP+1:GOTO410
400 SOUND1,1:GOTO350
410 LP=100:HCLS:FORPL=1TO NP:SC(
PL)=0:PL$(PL)=STRING$(9,32):GOSU
B1550:NEXTPL
420 '
430 'SELECT A STARTING WORD.
440 '
450 READ A:B=RND(A):FORA=1TO B:R
EADA$:NEXTA
460 '
470 'INITIALIZE GAME BOARD
480 '
490 FORX=1TO15:FORY=1TO15
500 IFRND(0)>.07THEN520
510 GB$(X,Y)=MID$(STR$(RND(4)),2
,1)
520 NEXTY,X:FORT=1TOLEN(A$):GB$(
T+4,8)=MID$(A$,T,1):NEXTT
530 '
540 'START THE GAME
550 '
560 FORPL=1TO NP
570 '
580 'PUT GAME BOARD ON SCREEN
590 '
600 ONBRKGOTO1110:HCOLOR8,0:HSCR
EEN2:POKE&HFF9A,BD:HLINE(95,22)-
(215,143),PSET,B
610 FORT=103TO214STEP8:HLINE(T,2
3)-(T,143),PSET:NEXTT:FORT=31TO1
43STEP8:HLINE(95,T)-(215,T),PSET
:NEXTT
620 FORX=1TO15:FORY=1TO15:IFGB$(
X,Y)<"1"OR GB$(X,Y)>"4"THEN640
630 A=VAL(GB$(X,Y)):IFA=1THENHPA
INT(X*8+93,Y*8+20),3,8:ELSEIFA=2
THENHPAINT(X*8+93,Y*8+20),7,8:EL
SEIFA=3THENHPAINT(X*8+93,Y*8+20)
,2,8:ELSEHPAINT(X*8+93,Y*8+20),5
,8
640 HCOLOR4:IF(GB$(X,Y)>"@"AND G
B$(X,Y)<="Z")OR GB$(X,Y)="*"THEN
HPRINT(X+11,Y+2),GB$(X,Y)
650 NEXTY,X
660 HCOLOR2:HLINE(80,168)-(227,1
91),PSET,B:GOSUB1700:HLINE(0,0)-
(319,15),PRESET,BF:HLINE(0,144)-
(319,160),PRESET,BF
670 HCOLOR8:HPRINT(6,0),"PLAYER
#"+MID$(STR$(PL),2)+":"+STR$(SC(
PL))
680 HPRINT(6,1),"ENTER YOUR WORD
 OR CLICK TO PASS.":W$=""
690 HCOLOR1:HLINE(LEN(W$)*8+96,1
59)-(LEN(W$)*8+101,159),PSET:FOR
T=0TO25:NEXTT:HLINE(LEN(W$)*8+96
,159)-(LEN(W$)*8+101,159),PRESET
:FORT=0TO25:NEXTT:IFBUTTON(0)=1T
HEN WS=0:GOTO1040
700 A$=INKEY$:IFA$=""THEN690:ELS
EIFA$=CHR$(13)ANDLEN(W$)>1THEN76
0:ELSEIFA$=CHR$(8)THEN730
710 IFLEN(W$)>14THEN690:ELSEIFA$
="*"THEN720:ELSEIFA$<"A"OR A$>"Z
"THEN690
720 HCOLOR6:HPRINT(12+LEN(W$),19
),A$:W$=W$+A$:GOTO690
730 IFW$=""THEN690
740 W$=LEFT$(W$,LEN(W$)-1)
750 HLINE(96,152)-(300,159),PRES
ET,BF:HCOLOR6:IFW$=""THEN690:ELS
EHPRINT(12,19),W$:GOTO690
760 HLINE(0,8)-(319,15),PRESET,B
F:HCOLOR8:HPRINT(6,1),"FIND STAR
T POSITION OF WORD."
770 PX=INT(JOYSTK(0)/4.25)+1:PY=
INT(JOYSTK(1)/4.25)+1
780 HGET(PX*8+88,PY*8+16)-(PX*8+
95,PY*8+23),1:HCOLOR6:HLINE(PX*8
+88,PY*8+16)-(PX*8+95,PY*8+23),P
SET,BF:FORT=0TO10:NEXTT
790 HPUT(PX*8+88,PY*8+16)-(PX*8+
95,PY*8+23),1
800 IFINKEY$=CHR$(12)THEN660:ELS
EIFBUTTON(0)<>1THEN770
810 HLINE(0,8)-(319,15),PRESET,B
F:HCOLOR8:HPRINT(6,1),"WHICH DIR
ECTION? (USE ARROW KEYS)"
820 DX=0:DY=0:A$=INKEY$:IFA$=CHR
$(12)THEN660:ELSEIFA$=CHR$(9)THE
NDX=1:ELSEIFA$=CHR$(10)THENDY=1:
ELSE820
830 TP$=PL$(PL):UL=0:AL=0:LX=PX:
LY=PY:LW=1
840 IFGB$(LX,LY)=MID$(W$,LW,1)TH
EN AL=1:GOTO880
850 IFGB$(LX,LY)>"@"AND GB$<="Z"
THEN920
860 I=INSTR(TP$,MID$(W$,LW,1)):I
FI=0THEN920
870 MID$(TP$,I,1)=" ":UL=1
880 LX=LX+DX:LY=LY+DY:LW=LW+1:IF
LW>LEN(W$)THEN910
890 IFLX<10R LX>15OR LY<10R LY>1
5THEN970
900 GOTO840
910 IFUL=0OR AL=0THEN920:ELSE980
920 HLINE(0,8)-(319,15),PRESET,B
F:HCOLOR3:HPRINT(6,1),"LETTERS D
O NOT MATCH!!!"
930 IFINKEY$<>""THEN930
940 IFBUTTON(0)<>0THEN940
950 IFINKEY$=""AND BUTTON(0)=0TH
EN950
960 GOTO660
970 HLINE(0,8)-(319,15),PRESET,B
F:HCOLOR3:HPRINT(6,1),"WORD TOO
LONG!!!":GOTO930
980 LX=PX:LY=PY:DW=0:TW=0:WS=0:P
L$(PL)=TP$
990 FORT=1TOLEN(W$):GB$(LX,LY)=M
ID$(W$,T,1):P=HPOINT(LX*8+93,LY*
8+20):HCOLOR6:HPRINT(LX+11,LY+2)
,GB$(LX,LY):L=ASC(MID$(W$,T,1))-
64:IFL=-22THEN L=27
1000 WS=WS+PEEK(4000+L):IFP=3THE
N TW=TW+1:ELSEIFP=7THEN DW=DW+1:
ELSEIFP=2THEN WS=WS+PEEK(4000+L)
+PEEK(4000+L):ELSEIFP=5THEN WS=W
S+PEEK(4000+L)
1010 LX=LX+DX:LY=LY+DY:NEXTT
1020 IFDW>0THEN WS=WS*2:DW=DW-1:
GOTO1020
1030 IFTW>0THEN WS=WS*3:TW=TW-1:
GOTO1030
1040 HCOLOR8:SC(PL)=SC(PL)+WS:HL
INE(0,0)-(319,15),PRESET,BF:HPRI
NT(6,0),"PLAYER #"+MID$(STR$(PL)
,2)+":"+STR$(SC(PL))
1050 HPRINT(6,1),"SCORE FOR THIS
 WORD:"+STR$(WS)
1060 HPRINT(11,18),"CLICK TO CON
TINUE."
1070 IFBUTTON(0)<>0THEN1070
1080 IFBUTTON(0)=0THEN1080
1090 NEXT PL:FORPL=1TO3:IFINSTR(
PL$(PL)," ")<>0THENGOSUB1550
1100 NEXTPL:GOTO540
1110 HCOLOR8,0:HSCREEN2:POKE&HFF
9A,BD:FORT=1TO NP:HPRINT(10,T*2)
,"PLAYER #"+MID$(STR$(T),2)+":"+
STR$(SC(T)):NEXTT
1120 A$="CLICK BUTTON FOR MENU."
:LN=23:GOSUB1340
1130 GOTO1310
1140 POKE65497,0:ONBRKGOTO1140:H
COLOR8,0:HSCREEN2:POKE&HFF9A,BD:
HPRINT(1,0),"ABOUT ADD-ON  PLAY
GAME  COLORS  BASIC"
1150 HLINE(0,8)-(319,8),PSET:HLI
NE(111,0)-(111,8),PSET:HLINE(199
,0)-(199,8),PSET:HLINE(263,0)-(2
63,8),PSET
1160 GOSUB1740:GOSUB1780:GOSUB18
30:IFBUTTON(0)=0THEN1160
1170 IFPY>8THENSOUND1,1:GOTO1160
1180 IFPX<111THEN1210:ELSEIFPX<1
99THEN280:ELSEIFPX<263THEN1350
1190 POKE65496,0:POKE113,0:EXEC(
PEEK(&HFFFE)*256+PEEK(&HFFFF))
1200 NEW
1210 HCLS:A$="ADD-ON WORD GAME":
LN=2:GOSUB1340:A$="(C) MARCH 29,
 1989 BY":GOSUB1340:A$="JOEL MAT
HEW HEGBERG":GOSUB1340
1220 HPRINT(3,16),"ANY QUESTIONS
 ABOUT THIS PROGRAM MAY":HPRINT(
3,17),"BE DIRECTED TO THE AUTHOR
:":HPRINT(3,19),"Joel Mathew Heg
berg":HPRINT(3,20),"936 North Tw
elfth Street":HPRINT(3,21),"De K
alb, Illinois  60115"
1230 LN=23:A$="CLICK TO CONTINUE
.":GOSUB1340
1240 IFBUTTON(0)=1THEN1240
1250 GOSUB1740:GOSUB1780:GOSUB18
30:IFBUTTON(0)=0THEN1250
1260 HCLS:A$="INDIVIDUAL LETTER
SCORES":LN=1:GOSUB1340
1270 RESTORE:FORT=1TO26:READA$,A
:NEXTT:FORT=1TO26
1280 READA:IFT/2<>INT(T/2)THENHP
RINT(3,LN),CHR$(T+64)+"="+STR$(A
)+" POINT(S)":ELSEHPRINT(23,LN),
```

```
CHR$(T+64)+"="+STR$(A)+" POINT(S
)":LN=LN+1
1290 NEXTT:HPRINT(13,LN),"*= Ø P
OINT(S)"
1300 A$="CLICK TO RETURN.":LN=23
:GOSUB1340
1310 IFBUTTON(Ø)<>ØTHEN1310
1320 GOSUB1740:GOSUB1780:GOSUB18
30:IFBUTTON(Ø)<>1THEN1320:ELSE11
40
1330 GOTO1330
1340 HPRINT(20-INT(LEN(A$)/2),LN
),A$:LN=LN+2:RETURN
1350 HCLS:A$="CLICK HERE TO RETU
RN":LN=Ø:GOSUB1340:HLINE(Ø,8)-(3
19,8),PSET
1360 HCOLOR8:FORT=ØTO8:HLINE(150
,20+T*12)-(170,30+T*12),PSET,B:N
EXTT
1370 FORT=ØTO8:HPAINT(160,21+T*1
2),T,8:NEXTT
1380 HPRINT(17,16),"BOARDER":HPR
INT(19,17),"CMP":HPRINT(19,18),"
RGB"
1390 GOSUB1740:GOSUB1780:GOSUB18
30:IFBUTTON(Ø)=ØTHEN1390
1400 IFPY<12THEN1140
1410 IFPY>126THEN1460
1420 IFPX<150OR PX>170THENSOUND1
,1:GOTO1390
1430 P=PEEK(&HFFBØ+INT((PY-20)/1
2)):IFP>63THEN P=P-64
1440 P=P+1:IFP>63THEN P=Ø
1450 POKE&HFFBØ+INT((PY-20)/12),
P:GOTO1390
1460 IFPY>151THENSOUND1,1:GOTO13
90:ELSEIFPY<136THEN1500
1470 IFPX<152OR PX>175THENSOUND1
,1:GOTO1390
1480 IFPY<144THENCMP:BD=Ø:POKE&H
FF9A,Ø:GOTO1390
1490 POKE&HFF9A,Ø:BD=Ø:RGB:GOTO1
390
1500 IFPX<136OR PX>191THENSOUND1
,1:GOTO1390
1510 BD=BD+1:IFBD>63THEN BD=Ø
1520 POKE&HFF9A,BD:GOTO1390
1530 GOTO1530
1540 '
1550 'USER LETTER SELECTION
1560 '
1570 IFLP<1THENRETURN:ELSEHCOLOR
8,Ø:HSCREEN2:POKE&HFF9A,BD:HPRIN
T(9,Ø),"PLAYER #"+STR$(PL):HPRIN
T(9,1),"SELECT YOUR TILE(S).":HC
OLOR2:HLINE(80,168)-(227,191),PS
ET,B:GOSUB1700
1580 FORX=ØTO9:FORY=ØTO9:IFZZ$(X
*10+Y+1)<>""THEN HCOLOR4,Ø:HLINE
(50+X*22,30+Y*13)-(50+X*22+15,30
+Y*13+9),PSET,BF
1590 NEXTY,X
1600 IFLP<1THENRETURN:ELSEGOSUB1
740:GOSUB1780:GOSUB1830
1610 IFBUTTON(Ø)<>1THEN1600
1620 IFPX<50OR PX>263OR PY<30OR
PY>156THEN SOUND1,1:GOTO1600
1630 GX=INT((PX-50)/22):GY=INT((
PY-30)/13):IFHPOINT(50+GX*22,30+
GY*13)<>4THENSOUND1,1:GOTO1600
1640 HLINE(50+GX*22,30+GY*13)-(5
0+GX*22+15,30+GY*13+9),PRESET,BF
1650 IFBUTTON(Ø)<>ØTHEN1650
1660 LT$=ZZ$(GX*10+GY+1):ZZ$(GX*
10+GY+1)="":FORT=1TO9:IFMID$(PL$
(PL),T,1)=" "THENMID$(PL$(PL),T,
1)=LT$:ELSENEXTT
1670 LP=LP-1:GOSUB1700:FORT=1TO9
:IFMID$(PL$(PL),T,1)=" "THEN1600
1680 NEXTT:FORT=ØTO800:NEXTT:RET
URN
1690 END
1700 FORT=1TO9:IFMID$(PL$(PL),T,
1)=" "THEN1720
1710 HCOLOR4:HLINE((T+4)*16+4,17
Ø)-((T+4)*16+16,189),PSET,BF:HCO
LOR8:HPRINT(T*2+9,22),MID$(PL$(P
L),T,1)
1720 NEXTT:RETURN
1730 '
1740 'GET POINTER LOCATION
1750 '
1760 PX=JOYSTK(Ø)*5:PY=JOYSTK(1)
*3:RETURN
1770 '
1780 'PUT POINTER ON SCREEN.
1790 '
1800 HGET(PX,PY)-(PX+5,PY+5),1
1810 HCOLOR8:HLINE(PX,PY)-(PX+5,
PY+5),PSET:HLINE(PX+4,PY)-(PX,PY
),PSET:HLINE-(PX,PY+4),PSET:RETU
RN
1820 '
1830 'ERASE POINTER
1840 '
1850 HPUT(PX,PY)-(PX+5,PY+5),1:R
ETURN
```


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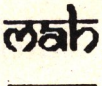

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System Requirements (both programs)
CoCo3, OS-9 LVL II, Multi-Vue, Disk Drive and 512k
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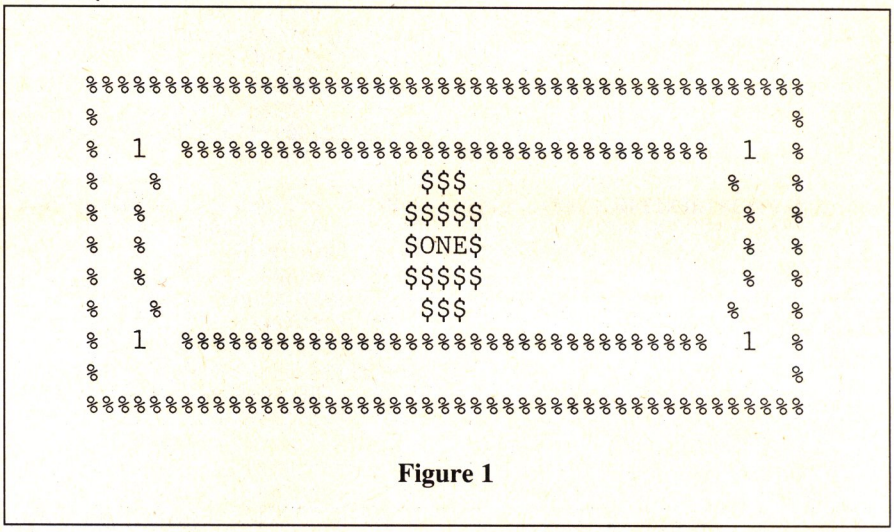
Huck Bucks

by Sharon Ling

Children love to play with money. And now they can make their own play money with *Huck Bucks*. The dollar bill created by this program can be altered by changing the ASCII code for the border or the center. For example to change the dollar sign in the center to an asterisk, first find the ASCII code for the asterisk. Next type `PRINT ASC("*")` and press ENTER. The computer will display 42, the code for the asterisk. Then in lines 100, 110, 130 and 140 change the number 36 (found in the middle of the data line) to 42. Run the program and the middle will be starred.

To change the value of the money, lines 90, 120 and 150 should be changed. The changes to $5, $10, $20 and $50 are listed below.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EPROM Programmer Handbook

by Tony DiStefano
Contributing Editor

Data used to program an EPROM can be a customized DOS, a frequently used utility, or a fun game. In some cases a knowledge of machine-language programming may be necessary. Whatever the data, it must be in memory before you load and execute the *MPROM* software. The software expects the data to start at memory location 12288 ($3000). All numbers in Hex will be preceded by a $. In the case of a 2764 EPROM, the data ends at 20479 ($4FFF). For a 27128 chip, the end address is 28671 ($6FFF). In the case of the 27256, only half of the EPROM can be programmed at a time. To program a 27256 you must program both halves individually and make sure you program the right data. In both cases the data start and end locations are the same as a 27128.

After the data is loaded into memory, load the MPROM software by typing `LOADM "MPROM":EXEC`. You are greeted with the title page and the option to work with a 2764, a 27128 or one of two halves of a 27256 EPROM. Choose the proper EPROM and press ENTER. If the wrong EPROM is inserted into the socket, you will not damage the EPROM or the adapter, but it will not properly program or verify.

The next screen to appear is the Main menu. Following is a detailed description of each item in this menu.

`1. EPROM ERASED?` — verifies the EPROM is completely erased. Initially and after each erasure, all bits of the EPROM are in the logic 1 (High) state. The status line starts by printing

```
CHECKING FOR FF's
```

If all bits are erased the status line will indicate OK! at the end. If a location is not properly erased, the status line appears as

```
AT XXXX EXPECTED FF FOUND YY
```

XXXX is the EPROM address (starting from 0), *FF* is the expected data (in this case it is all ones or 255, $FF) and *YY* is the actual data found. If more than one address is not completely erased, the last non-erased address appears on the status line. When checking an EPROM to make sure it is erased, the OK must appear on the status line. If just one bit is missing, the EPROM is not fully erased and cannot be properly programmed. To erase a used EPROM, use ultraviolet light. Refer to the EPROM eraser's manual for more details.

`2. PROGRAM EPROM` — starts the programming process. This transfers the data in memory to the EPROM. Before starting this process, make sure the properly erased EPROM is placed in the socket. Pin 1 of the EPROM goes to Pin 1 of the socket. Pin 1 of the socket is in the lower right corner when sitting in front of the keyboard with the MPROM and controller plugged into the computer. Make sure the battery pack is properly connected before starting. The process starts by displaying the following message on the status line

```
PROGRAMMING ADDRESS: XXXX YY
```

XXXX is the current EPROM address being programmed and *YY* is the program pulse width. Let me explain. In the good old days it was believed that each location of an EPROM had to be programmed for about 50ms, or about 1/20 of a second. It doesn't sound like a lot of time, but when you have a 16K EPROM, it takes over 14 minutes. Today's EPROMs do not have to be programmed so long. Initially, a 1ms program pulse is sent to the address being programmed. If it proves to be enough and the data is correct, a 4ms insurance pulse is given. If the verification shows invalid data, additional 1ms pulses are sent until the data is correct or the system has sent a maximum of 15 pulses. Then an insurance pulse four times greater than the number of pulses sent is given and the value of YY is changed to reflect the new pulse width. If the EPROM data is still not valid, the program gives up and issues a status line of

```
EPROM NOT PROGAMMED PROPERLY
AT ADDRESS:XXXX
```

XXXX is the address where the EPROM failed. At this point, re-program the EPROM. If it fails at the same address, there is a problem with the EPROM and it should not be used. If it fails at the next address, the batteries may be weak and need replacing. Caution: Never plug or unplug the battery pack with an EPROM in the socket. Always remove the EPROM first. When all the addresses of the EPROM are properly programmed, OK! is printed on the status line.

`3. VERIFY EPROM` — Even though EPROMs are verified during the programming stage, it is sometimes necessary to verify an EPROM without programming it, such as when comparing two EPROMs. The EPROM is verified by comparing the data found in the

---

Tony DiStefano is a well-known early specialist in computer hardware projects. He lives in Laval Ouest, Quebec. Tony's username on Delphi is DISTO.

EPROM to that in memory. The status line reads

```
VERIFYING EPROM
```

If no difference is found, OK! is displayed on the status line. If a difference is found the status line changes to

```
AT XXXX EXPECTED YY FOUND ZZ
```

XXXX is the address where the discrepancy was found, *YY* is the data it expected to find and *ZZ* is the actual data found. If more discrepancies are found, only the last one is shown on the screen.

4. READ EPROM — It is sometimes necessary to transfer data from one EPROM to another or from an EPROM to disk. In either case data must first be transferred from EPROM to memory. This option transfers the contents of the EPROM into memory. The data resides in memory starting from 12288 ($3000) and is either 8K or 16K for a 2764 and 27128 respectively. Either half of a 27256 is 16K. The status line displays

```
MOVING EPROM TO MEMORY
```

and OK! is printed when the move is finished. No verification is done when reading the EPROM. Verify the EPROM after a move with Option 3.

5. RETURN TO BASIC — When all EPROM activity is completed, this option returns you to BASIC. The MPROM software is still intact and you can return to it by entering EXEC (as long as you have not changed the execute address). The EPROM data is also intact. It is still in memory and unchanged. Now is the time to save the EPROM data to disk. For a 2674 the proper format for saving data is

```
SAVEM "filename",&H3000,&H4FFF,&
HA027
```

filename is the standard filename, extention and drive number. The next three values are the start, end and execute addresses. The execute address has been chosen so that a warm start to BASIC will not crash into unwanted data. To save a 27128 or either half of a 27256 EPROM data, change the end address value from &H4FFF to &H6FFF.

6. EXAMINE/CHANGE MEMORY — used to change or verify existing data already loaded into memory. The status line prompts you for a start address. The address must be entered in Hex values only. When you are finished, press ENTER. The next line displayed shows the address requested and the contents of that memory location. You have three choices. The first choice is to use the up or down arrows to increase or decrease the address value by one. You can also enter a two digit Hex value that will automatically replace the old value. Or simply press ENTER and return to the Main menu.

Hints & Tips

A. Use these steps to make a copy of a DOS already in the controller on a CoCo 1 or 2.

1) Use the DOS command (or pokes) to switch to the desired DOS (DISTO Super Controller I only). Insure that the logo of the DOS you want copied is on the screen.
2) Save the DOS on disk:
For an 8K DOS, enter

```
SAVEM "filename",&HC000,&HDFFF,&
HA027
```

For a 16K DOS, enter

```
SAVEM "filename",&HC000,&HFEFF,&
HA027
```

3) With the MPROM adapter properly plugged in, reload the DOS with an offset:

```
LOADM "filename",&H7000
```

4) Load and execute the MPROM software. The offset used in Step 3 automatically puts that DOS at address 12288 ($3000).
5) Select the 2764 EPROM for an 8K DOS or the 27128 EPROM for a 16K DOS.
6) Insert the proper EPROM into the ZIF socket.
7) Insure the EPROM is blank by choosing Option 1 on the Main menu.
8) Program the EPROM with Option 2.
9) Verify that the EPROM is properly programmed by selecting Option 3.
10) Remove the EPROM from the ZIF socket. Turn the computer off and insert the EPROM into your Disto controller.

To burn EPROMs with disk-loaded DOSs, such as ADOS, follow the instructions supplied with the DOS on how to prepare it for EPROM. Then follow steps 2 through 10 above.

Burning a new DOS with a CoCo 3 is somewhat different. The DOS does not operate from ROM as with the CoCo 1 and CoCo 2. Instead, the CoCo 3 software reads the DOS into RAM, then modifies and adds to it. You cannot use the above steps. You must remove the DOS from the controller, temporarily replace it with another DOS and read the DOS in the EPROM programmer.

B. Some of the more experienced hardware buffs may want to fit a 2764 into a 24-pin socket. The following is a step-by-step procedure to do this. Soldering experience is required.

1) Move the two jumpers on the solder side of the MPROM board to cover the center pin and the other pin. This swaps A11 and A12 for the 24-pin socket.
2) Program the 2764 as usual.
3) Bend Pin 20 on the EPROM so it points up. Solder a short piece of wire from this pin to Pin 22.
4) Solder pins 1, 26, 27 and 28 together.
5) Solder a piece of wire to Pin 2 of the EPROM. Insert the other side of this wire into the socket hole left by Pin 20.
6) Inset the 2764 into the 24-pin socket. Pin 3 of the 2764 must go into Pin 1 of the socket, Pin 4 of the 2764 into Pin 2 of the socket, and so on.

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Contest Results

by William Barden, Jr.
Contributing Editor

Back in the July issue I listed eight problems for CoCo solutions, a request to beef up the speed of one of my answers and a reader challenge to solve a second puzzle for big bucks ($M 50,000,000 - 50 million MicroDollars). Reader response was excellent with Keiran Kenny of Cremorne, NSW, Australia, winning the special long distance award. I'm always amazed by the programming proficiency and knowledge of CoCo users. I usually wind up learning more from readers' letters than I provide in the column. Here are the exciting results of that challenge plus an extra bonus — a program to display playing cards on the screen.

Sum of Digits Puzzle

The original puzzle asked in how many ways nine digits could be written in three 3-digit rows so that they add up to the proper result. A typical row looks like this:

```
  645
  192
 ----
  837
```

There are 9*8*7*6*5*4*3*2*1 or 9! (read as nine factorial) configurations to check in this problem, a total of 362,880. As several readers pointed out, my programmed solution to the problem was wrong. As Paul H. Johnson, a faithful reader and computer-puzzle buff from San Francisco, put it: "I hate to mention it, but I believe your Line 215 is a bit flawed in that it does not recognize the possibility of a 'carry'." My program does not check for such units digits as 7+6=(1)3. This error eliminated about half of the possible answers. Paul used a high-speed poke with a string in his version.

> I'm always amazed by the programming proficiency and knowledge of CoCo users. I usually wind up learning more from readers' letters than I provide in the column.

Robert Gault of Grosse Point Woods, MI, did quite a bit of work on both a recursive BASIC09 program to compute the answers (about four hours from my 20 hours) and, even more impressive, an assembly language version, which computes all 336 solutions in just over six minutes!

Walter D. Pullen of Kent, WA, found an elegant solution. He used an array instead of nine separate variables. Walter immediately checked the units and tens digits to see if their sums equaled the answer digits. If not, he went directly to the next increment. He also noted that "if S1+S2+S3 is correct, then so is S2+S1=S3."

James Jones of Clive, Iowa, was another reader who did a great deal of work on a high-speed solution to this puzzle. His BASIC09 version computes the answers in 32 seconds on his CoCo 3. James (who by his comments revealed that he is either a bright computer science student or a professor) used a clever trick. He looped through only the addend digits and not the answer digits. This makes the number of iterations in the loop 9^6=531,441 instead of 9^9=387,420,489, only $^1/_{729}$ of the total. This is possible because with any two addend digits, the answer digit is fixed. Another observation he had was that the sum of the two 100s digits and any carry from below must be less than or equal to nine. This saves additional iterations. The third observation he made was the same as Walter's above. I have to give James the Son of Perplexing Puzzles #8 Award for his work. His OS-9 solution is shown in Listing 1.

Reader Challenge

Unfortunately, I was not very specific about the rules in my challenge to arrange the Ace, King, Queen and Jack of each suit (16 cards) in a four-by-four matrix so that no value or suit appears more than once in any row, column or major diagonal. Readers didn't know whether I wanted OS-9, BASIC, a physically short program, a fast program, or embellished program solutions. Again, it was James Jones who came through with the fastest overall version without manual calculations. In James' words, his OS-9 program "seems to chug out one solution per second."

One of the best non-OS-9 solutions came

Bill Barden has written 35 books and hundreds of magazine articles about small computers . His newest Color Computer project, Connecting the CoCo to the Real World, *is a book of CoCo interfacing projects. He has over 20 years experience in the industry on systems ranging from mainframes to micros.*

from Walter D. Pullen. It's shown in Listing 2. Walter writes, "my solution to the main card puzzle finds and displays the first solution in eight minutes. The second solution is found six minutes later, and thereafter a different solution is found every few minutes. There are 1152 total solutions to this puzzle, all of which happen to be geometrically similar to your example solution except that the board is rotated or the suits are switched. All possible solutions will be found in about three days. Note that there are potentially 16 factorial board solutions that must be checked to find them. If your sum of digits program checked 9! positions and ran in 20 hours, then a similar method employed here would take 16!/9!*20 hours or 132 centuries! To get a workable solution, we must use a little insight. Note that if the Jack of Clubs (J-C) is in the upper-left corner and the Jack of Hearts (J-H) is in the square next to it, then no matter where the other 14 cards are we can't have a solution because a Jack appears twice in the top row. This means we can avoid permutating through 14! (87 billion) boards in this case, and by applying similar checks at each position, we can reduce a complex problem with 16! (20 quadrillion) possibilities to an elegant program producing swift solutions. The program is completely general. Try reducing the value of N in Line 20 and solve the problem for a smaller board or add a new value and suit to V$ and S$ and find a solution to the five-by-five board. Whenever a board is found meeting the row and column restrictions, the message *testing* is printed, the diagonals are checked and if OK, the solution is displayed." While not nearly as fast as James' OS-9 program, Walter's is a well-crafted Extended Color BASIC version.

There were other entries that worked. Entries that found random configurations that gave one or more solutions and others in which the answers had more than one card value or suit in the same row, column or diagonal. I hope that all readers who responded will not be too offended over my lack of rule definition. In this case, I feel a fair judgment is to declare both James Jones and Walter D. Pullen co-winners, with James winning hands down for speed. Each co-winner will receive 25,000,000 MicroDollars (about $25 at current exchange rates) and, of course, adulation of Barden's Buffer readers for many years to come as readers peruse back issues in front of a roaring fire on those cold winter nights.

Displaying Playing Cards

As usual, I attempted to do grandiose things with limited graphics for this column. My original intention was to provide nice graphics for the King, Queen and Jack in addition to displaying all of the cards with numeric values. But even the CoCo 3, 640-by-192 graphics mode is not quite good enough for those face cards, although a reader might prove me wrong. A more modest program in Listing 3 shows a Display Card subroutine that will display any card value and suit at a given point on the CoCo 3 screen. (Thanks to Rick Cooper of Liberty, KY, for the DRAW strings for the suits). Call the program for a 320-by-192 CoCo 3 graphics screen with the following parameters:

- ZA$ = "*vs*" where *v* is the value - 1, 2, 3, 4, 5, 6, 7, 8, 9, T, J, Q, K, or A - and S is the suit - C for Clubs, H for Hearts, S for Spades or D for Diamonds. To specify the Ace of Hearts, for example, ZA$="AH".
- ZX, ZY = screen coordinates for the top-left corner of the card in *x,y* format. To draw the card so that the top-left corner is in the screen center set ZX=160 and ZY=96.

The cards are 50 pixels high by 60 pixels wide, allowing you to put five cards per row in three rows on the screen at one time. The actual subroutine assumes that the DRAW strings defining both the values and suits have been defined somewhere in your own program, in addition to a 13-element string array V$. One interesting feature of the program is that it inverts the value on the card bottom. You will see an upside down 10, for example, if you specify ZA$="TC". The suit is drawn upright in the center of the card.

This subroutine may come in handy for simulating poker or other card games, providing a lot more useful display than simply a "J-H" type of notation.

See you next month with more CoCo topics. ❑

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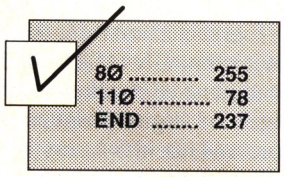
Listing 1: SumDigits.b09

```
PROCEDURE SumDigits
0000      BASE 0
0002      DIM d1,d2,d3,d4,d5,d6,d7,d8,d9,c1,c2:INTEGER
0031      DIM u1:INTEGER
0038      DIM InUse(10):BOOLEAN
0044
0045      (* goal: generate all possible sums of the following form: *)
0082     (* d1 d2 d3 + d4 d5 d6 = d7 d8 d9, where the d(i) are distinct *)
00C3      (* non-zero base digits. *)
00DE
00DF      FOR d1:=1 TO 9
00EF        InUse(d1):=FALSE
00F9      NEXT d1
0104
0105      (* units digits first... *)
0120      FOR d3:=1 TO 9
0130        InUse(d3):=TRUE
013A        FOR d6:=1 TO 9
014A          IF NOT(InUse(d6)) THEN
0157            InUse(d6):=TRUE
0161            RUN DigSum(d3,d6,d9,c2)
017A            IF d9<>0 AND NOT(InUse(d9)) THEN
018E              InUse(d9):=TRUE
0198              (* tens digits *)
01A9              FOR d2:=1 TO 9
01B9                IF NOT(InUse(d2)) THEN
01C6                  InUse(d2):=TRUE
01D0                  FOR d5:=1 TO 9
01E0                    IF NOT(InUse(d5)) THEN
01ED                      InUse(d5):=TRUE
01F7                      RUN DigSum(d2+c2,d5,d8,c1)
0213                      IF d8<>0 AND NOT(InUse(d8)) THEN
0227                        InUse(d8):=TRUE
0231                        (* hundreds digits *)
0246                        FOR d1:=1 TO 9
0256                          IF NOT(InUse(d1)) THEN
0263                            InUse(d1):=TRUE
026D                            u1:=9-(d1+c1)
027C                            IF u1>d1 THEN
0289                              u1:=d1
0291                            ENDIF
0293                            FOR d4:=1 TO u1
02A4                              IF NOT(InUse(d4)) THEN
02B1                                InUse(d4):=TRUE
02BB                                d7:=d1+c1+d4
02CB                                IF NOT(InUse(d7)) THEN
02D8                                  PRINT 100*d1+10*d2+d3; " + "; 100
                                       *d4+10*d5+d6; " = "; 100*
                                       d7+10*d8+d9
031B                                ENDIF
031D                                InUse(d4):=FALSE
0327                              ENDIF
0329                            NEXT d4
0334                            InUse(d1):=FALSE
033E                          ENDIF
0340                        NEXT d1
034B                        InUse(d8):=FALSE
0355                      ENDIF
0357                      InUse(d5):=FALSE
0361                    ENDIF
0363                  NEXT d5
036E                  InUse(d2):=FALSE
0378                ENDIF
037A              NEXT d2
0385              InUse(d9):=FALSE
038F            ENDIF
0391            InUse(d6):=FALSE
039B          ENDIF
039D        NEXT d6
03A8        InUse(d3):=FALSE
03B2      NEXT d3
03BD
03BE      END
```

```
PROCEDURE DigSum
0000      PARAM d1,d2,sum,carry:INTEGER
0013        sum:=d1+d2
001F        IF sum>9 THEN
002B          sum:=sum-10
0036          carry:=1
003D        ELSE
0041          carry:=0
0048        ENDIF
004A        END
```

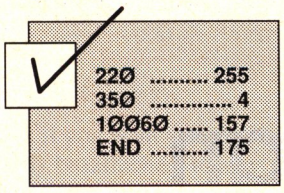
32K Extended



Listing 2: CARDPUZL

```
10 'CARDPUZL - BY WALTER PULLEN
- 21 JUNE 1990'
20 N=4:V$="JQKA":S$="CDHS":D=1
30 NN=N*N:DIM V(N,N),S(N,N),A(NN
),D(1,N,N*4):J=1
40 I=I+1:IF I>N THEN IF J>=N THE
N 100 ELSE I=1:J=J+1
50 V(I,J)=1:S(I,J)=0
60 S(I,J)=S(I,J)+1:IF S(I,J)>N T
HEN S(I,J)=1:V(I,J)=V(I,J)+1:IF
V(I,J)>N THEN S(I,J)=0:V(I,J)=0:
GOTO 140
70 A=V(I,J)*N+S(I,J)-N:IF A(A) T
HEN 60 ELSE X=0:Y=0
80 X=X+1:IF X<>I AND (V(X,J)=V(I
,J) OR S(X,J)=S(I,J)) THEN 60 EL
SE IF X<N THEN 80
90 Y=Y+1:IF Y<>J AND (V(I,Y)=V(I
,J) OR S(I,Y)=S(I,J)) THEN 60 EL
SE IF Y<N THEN 90 ELSE A(A)=1:T=
T+1:GOTO 40
100 PRINT "TESTING":FOR Y=1 TO N
:FOR X=1 TO 4*N:D(0,Y,X)=0:D(1,Y
,X)=0:NEXT X,Y
110 FOR Y=1 TO N:FOR X=1 TO N:D(
0,V(X,Y),X+Y)=D(0,V(X,Y),X+Y)+1:
D(1,S(X,Y),X+Y)=D(1,S(X,Y),X+Y)+
1:D(0,V(X,Y),3*N-X+1+Y)=D(0,V(X,
Y),3*N-X+1+Y)+1:D(1,S(X,Y),3*N-X
+1+Y)=D(1,S(X,Y),3*N-X+1+Y)+1:NE
XT X,Y
120 FOR Y=1 TO N:A=0:B=0:FOR X=1
 TO 4*N:A=A-(D(0,Y,X)>1):B=B-(D(
1,Y,X)>1):NEXT X:IF A>D OR B>D T
HEN 140 ELSE NEXT Y
130 U=U+1:FOR Y=1 TO N:FOR X=1 T
O N:PRINT " ";MID$(V$,V(X,Y),1);
MID$(S$,S(X,Y),1);:NEXT X:IF Y=1
 THEN PRINT,"SOLUTION:";U:NEXT Y
 ELSE PRINT:NEXT Y
140 I=I-1:IF I<1 THEN I=N:J=J-1:
IF J<1 THEN PRINT "DONE":END
150 A(V(I,J)*N+S(I,J)-N)=0:GOTO
60
```

32K Extended



Listing 3: DRAWCARD

```
100 ' SAMPLE SETUP
110 CLEAR 500
120 DIM V$(13)
130 HSCREEN2
140 HCLS
150 ' INCLUDE THESE STRING DEFIN
ITIONS SOMEWHERE
160 V$(2)="R5L5UE2R2EU2H2L2G"
170 V$(3)="BUFR2E2UHLRFU3H2L2G"
180 V$(4)="BR5U4RL6E4RD4"
190 V$(5)="BUFR3EU2HL4U4R5"
200 V$(6)="BRR3EU2HL3GD2BU3U2E3R
F"
210 V$(7)="E6U2L6"
220 V$(8)="BUFR3EU2HL3GD2BU4U2ER
3FD2G"
230 V$(9)="BUFR3EU6HL3GD2FR4"
240 V$(10)="R4L2U8G2E2BM+4,+8;R3
EU6HL2GD7"
250 V$(1)="U7ER3FD7U4L5"
260 V$(11)="BUF3REU7L2"
270 V$(12)="BUFR3H2F2EU6HL3GD6"
280 V$(13)="U8D4F4H4E4"
290 D$="E6F6G6H6"
300 H$="U2EURUR2DRDFEURUR2DRDFD2
G6H6"
310 S$="E6F6D2G2L4D2U2L4H2U2"
320 C$="E2RU2E2R2F2D2RF2D2G2L4D2
U2L4H2U2"
330 B$="R50D60L50U60D30BR19"
340 ' SAMPLE CALLING SEQUENCE
350 ZX=100:ZY=100:ZA$="QD":GOSUB
 10020
360 GOTO 360
10000 ' SUBROUTINE TO DRAW CARD
ON SCREEN
10010 ' ZA$="VS", ZX=SCREEN X CO
ORD, XY=SCREEN Y COORD
10020 ZU$=RIGHT$(ZA$,1)
10030 IF ZU$="C" THEN ZU$=B$+C$
ELSE IF ZU$="H" THEN ZU$=B$+H$ E
LSEIF ZU$="S" THEN ZU$=B$+S$ ELS
E ZU$=B$+D$
10040 ZV$=LEFT$(ZA$,1)
10050 IF ZV$="T" THEN ZV=10 ELSE
 IF ZV$="J" THEN ZV=11 ELSE IF Z
V$="Q" THEN ZV=12 ELSE IF ZV$="K
" THEN ZV=13
10060 IF VAL(ZV$)<>0 THEN ZV=VAL
(ZV$)
10070 GOSUB 10140
10080 HDRAW ZU$
10090 GOSUB 10140
10100 HDRAW "BM+4,+10"+V$(ZV)
10110 GOSUB 10140
10120 HDRAW "BM+47,+48"+"A2"+V$(
ZV)
10130 RETURN
10140 HDRAW "BM"+STR$(ZX)+","+ST
R$(ZY)+";"
10150 RETURN
```

Novices Niche

Game 4K

Hot Gold
by Keiran Kenny

This program is for the small child who is not up to hi-speed, zip'em and zap'em games. Gold is hidden at a random location on the CoCo's black screen and after a slight delay a cursor appears on the screen in another random location. This slight delay is necessary to ensure the cursor and the gold do not appear in the same location.

Press an arrow key to move the cursor. If the cursor moves toward the gold cache you're hot. If it moves away from the location of the gold cache you're cold. CoCo will print the word *gold* in big golden letters when you hit the spot.

The cursor's movement is intentionally slow to match the reaction time of a small child. To speed it up, reduce the value of DL in Line 10. To slow it down, increase the value of DL.

The Listing: HOTGOLD

```
0 'COPYRIGHT 1990 FALSOFT, INC.
1 'HOT GOLD' by Keiran Kenny,
   Sydney, 1989.
10 CLEAR200:DL=200
20 DIMP(68)
30 FORT=1TO68:READL:P(T)=L:NEXT
40 DATA 0,1,2,3,4,32,36,64,96,12
8,160,192,193,194,195,196,164,13
2,131,7,8,9,10,11,39,71,103,135,
167,199,200,201,202,203,171,139,
107,75,43
50 DATA 14,46,78,110,142,174,206
,207,208,209,210,21,53,85,117,14
9,181,213,214,215,216,185,153,12
1,89,57,24,23,22
60 CLS0
70 PRINT@0,"**HOT OR COLD!  LOOK
 FOR GOLD!**";
80 FORD=1TO2000:NEXT
90 H=5+RND(58):V=5+RND(26)
100 X=RND(64)-1:Y=2+RND(29):IFX=
H ORY=V THEN100ELSESET(X,Y,2)
110 IFX<H THENHL=H-X ELSEHL=X-H
120 IFY<V THENVL=V-Y ELSEVL=Y-V
130 K$=INKEY$:IFK$<>CHR$(8)ANDK$
<>CHR$(9)ANDK$<>CHR$(10)ANDK$<>C
HR$(94)ORK$=""THEN130ELSERESET(X
,Y)
140 PRINT@0,CHR$(31)
150 IFPEEK(341)=247THENY=Y-1:IFY
+1<=V THENPRINT@14,"COLD!"ELSEIF
Y+1>V THENPRINT@14,"HOT!"
160 IFPEEK(342)=247THENY=Y+1:IFY
-1>=V THENPRINT@14,"COLD!"ELSEIF
Y-1<V THENPRINT@14,"HOT!"
170 IFPEEK(344)=247THENX=X+1:IFX
-1>=H THENPRINT@14,"COLD!"ELSEIF
X-1<H THENPRINT@14,"HOT!"
180 IFPEEK(343)=247THENX=X-1:IFX
+1<=H THENPRINT@14,"COLD!"ELSEIF
X+1>H THENPRINT@14,"HOT!"
190 IFX=H ANDY=V THENRESET(X,Y):
GOTO260
200 IFY<3THENY=3
210 IFY>31THENY=31
220 IFX<0THENX=0
230 IFX>63THENX=63
240 SET(X,Y,2):FORD=1TODL:NEXT:R
ESET(X,Y)
250 GOTO140
260 HV=131
270 FORZ=1TO68:SOUND60+Z,1:PRINT
@HV+P(Z),CHR$(159);:NEXT
280 PRINT@6,"YOU STRUCK GOLD!!!"
290 FORD=1TO3000:NEXT
300 PRINT@1,"LUCKY YOU! LOOK FOR
 MORE? Y/N"
310 K$=INKEY$:IFK$=""THEN310
320 IFK$="Y"THENCLS0:GOTO70
330 IFK$="N"THENCLS:END
340 GOTO310
```

The Delphi Mailman

by Eddie Kuns
OS-9 SIG Database Manager

There has been some confusion about how to send mail on Delphi, so I thought I would explain Mail this month. Mail allows you to send private messages (or files) to other users on Delphi. This is different from the Forums in which all messages are publicly viewable.

To enter Mail, type MAIL at the CoCo or OS-9 SIG prompt, or type MAIL MAIL at Delphi's Main menu. You can also enter Mail by typing /MAIL at almost any prompt within Delphi. To leave the Mail area, press CTRL-Z or type EXIT at the Mail> prompt. While in Mail, Delphi's slash commands (such as /WHO) no longer work.

From Mail you can send a message to someone by entering SEND and responding to the prompts. While you type your message, remember to press ENTER after each line of text. Press CTRL-Z to send the completed message. If you change your mind while editing a message, press CTRL-C to cancel it. For example:

```
MAIL> send

To: gregl, rickadams
Subj: I'm back!

Hello. Just wanted to let you know
that I am back from vacation. I'll see
you online later.

Eddie
^Z

MAIL>
```

Eddie Kuns is pursuing a PhD in physics at Rutgers University. He lives in Aurora, Illinois and works as a programmer and researcher at Fermilab. Eddie is database manager of the OS-9 SIG; his username is EDDIEKUNS.

Notice that the same message can be sent to several individuals — just type all the usernames, separated by commas or spaces, of those people you want to receive the message.

You can read new mail by pressing ENTER at the Mail> prompt. To find out who the messages are from and what the subjects are before reading the mail, enter DIR. Specific messages can be read by entering the number associated with that message. You can then press ENTER to see any following messages. If you receive a new message while you are in the Mail area, enter READ/NEW to read them.

When you read a message, you'll notice the sender's name looks like BOS1B::EDDIEKUNS. Most likely, the BOS1B:: part of the name is not important to you — it merely tells you which Delphi computer the sender was logged on to when they sent you the message. You don't need to include the computer name when you send mail to other users — simply specify their usernames. For the curious, BOS1B means it's machine 1B at Boston, Delphi's central location.

REPLY and SEND/EDIT are two useful mail commands. Once you have read a message and want to send a reply to the author, enter REPLY. Mail automatically supplies the name of the person you are replying to and the subject of the reply. If you want to edit the message use the SEND/EDIT or REPLY/EDIT commands. This leaves you in your selected editor (EDT or OLDIE) to edit the text of the message as you enter it. The message is sent when you exit the editor. If you want to reply to a message and include parts of the message in your reply you can enter REPLY/EXTRACT. This returns you to your selected editor with the text of the message to which you are replying.

Mail can also be used to send a file, which is convenient if you have edited a message offline or want to send a program or file. First, upload the file (ASCII or binary) into your Workspace. To send the file, type SEND followed immediately with a space and the exact name of the file as it exists in your Workspace. It looks like this:

SEND *filename.ext*

To download a mail message enter

EXTRACT/NOHEADER *filename.ext*

right after you read the message. *filename.ext* is the name you want Delphi to use when it stores the file in your Workspace. You can then go to your Workspace and download the file.

Use caution when sending and receiving files, however. Delphi allows each user only 50 *free* blocks (or 25K) of disk space. You must pay for disk usage above that limit. Enter DIR while in your Workspace to find out how much you are using. Once you have downloaded a file from your Workspace, be sure to delete it using the DELETE command. Once you no longer need a message, delete it. Deleting a message may not immediately free its space, however. Mail waits until the total amount of deleted mail exceeds a threshold before purging it from your mail file (MAIL.MAI) in your Workspace. You may want to periodically enter the command PURGE/RECLAIM to clean out your mail file. Purging isn't enough, though. While the message text is deleted, your mail file still contains space for the directory information of the file. If you receive a lot of mail, you will want to occasionally use the COMPRESS command. This removes all unused space from your mail file. After using COMPRESS, go into your Workspace and delete the MAIL.OLD file, which is your old mail file.

Within Mail are a number of parameters you can set. Enter SHOW ALL to display your current settings. A very useful parameter is

PERSONAL_NAME. If you want your real name (or a phrase) to be attached to any mail messages you send, enter the command

SET PERSONAL_NAME *"real name"*

You can find additional information about Mail's features by typing HELP. Next month I'll describe how to use folders within Mail. This is a convenient way of sorting the messages that you don't want to immediately delete.

Database Information:

When you upload a group of files to the OS-9 SIG database, please direct your submission to the right Topic area. You don't need to submit it to New Uploads. Your group is automatically placed in New Uploads for about a month and will then be moved into the appropriate database area.

Tim Kientzle released make, a useful utility for anyone writing code. This version of make was ported from UNIX. Rick Adams' patch for *T/SEdit* allows it to run in an OS-9 Level II device window. Finally, the enhanced gfx2 (a new version of gfx2 for BASIC09) uploaded by Kevin Darling is the one Dale Puckett has been talking about for several months in "KISSable OS-9."

Tetris has finally made its way to OS-9 on the Color Computer. Mike Sweet ported it from UNIX to OS-9. Matthew Thompson posted information about the 68070 and VSC chips which make up the heart of the MM/1 and TC-70 computers.

In the CoCo SIG, Glen Dahlgren contributed utilities that allow you to play sound files created with *SoundTrax*, as well as a sample which is described as a rap for *Kyum Gai: To be Ninja*. Marty Goodman posted the first new entry into the Soapbox database area since its creation with a trip report by Phillip Brown (THEFERRET) describing a recent visit to the Soviet Union as part of the University of California at Berkeley Glee Club. ❑

Database Report

OS-9 Sig

Applications:

MVFINANCE.AR	
07ESRTIMOTHY	Tim Faddon
MAKE FUNNY ENQUIRER HEADLINES	
KENCARLIN	Ken Carlin

Utilities:

DEARC	
EMTWO	Paul M. Fitch Jr.
FILE UNFRAGMENTER	
ZACKSESSIONS	Zack Sessions
KEYBOARD DIAGRAM	
RODHARPER	Rodney Harper
QTIP 3.1 DISK REPAIR PROGRAM	
JOHNTORONTO	John Beveridge
GRAPHICS COMPOSER/FORMATTER	
JOHNTORONTO	John Beveridge
AIF MANAGER	
AIRBORNE	Jeff Shearman
MAKE 1.1	
TIMKIENTZLE	Tim Kientzle
BASE CONVERSION	
TIMKIENTZLE	Tim Kientzle
XPRES.ARC	
XLIONX	Mark W. Farrell
PATCH TO SUPER DIRECTORY	
ZACKSESSIONS	Zack Sessions

Device Drivers:

DISTO SASI DRIVER PATCH	
KSCALES	Ken Scales

Patches:

SHELL+ 2.1 PATCH	
PAULSENIURA	Paul Seniura
CHANGE TERM FROM/TO 40/80 COLUMN	
MKJ	Ken Heist
TSEDIT PATCH FOR DEVICE WINDOWS	
RICKADAMS	Rick Adams
ENHANCED GFX2	
OS9UGPRES	Kevin Darling

Telcom:

OS9BBS VERSION 1.3	
EMTWO	Paul M. Fitch Jr.

Graphics & Music:

TIGER VEF	
SCG	Steve Gilbert
WEBER CORRECTION	
HAZE	Hadley Hazen
THE CHURCH LADY	
MICHAELJN	Mike Nelson
TETRIS FOR OS-9	
DODGECOLT	Mike Sweet
SOUND MASTER	
JMLSOFT	Jim McDowell
OWLCASE.VEF	
SCG	Steve Gilbert
BUGS BUNNY SPEAKS OUT	
MICHAELJN	Mike Nelson
MORE DIGITIZED SOUNDS	
MICHAELJN	Mike Nelson
DEPTHCHARGE	
WJMOORE	Warren Moore
WEBER'S CONCERTINO	
HAZE	Hadley Hazen
THREE STOOGES	
MICHAELJN	Mike Nelson
COLLECTION OF DIGITIZED SOUNDS	
MICHAELJN	Mike Nelson

Programmers Den:

COMPILED DEARC	
SEBJMB	Jeff Blower
TIMEX.PAK	
MISHOO	Mike Shook

68K-OS9:

68070/VSC SPEC LOWDOWN	
MATHOMPSON	Matthew Thompson
KENNETH LEIGH PRESS RELEASES	
PKW	Paul K. Ward

CoCo Sig

CoCo 3 Graphics:

INGRID002.IMG	
TRAS	Richard P. Trasborg
KATHY001	
TRAS	Richard P. Trasborg
RASGO.BAS & INGRID	
TRAS	Richard P. Trasborg
GIF FILES	
TOMMIETAYLOR	Tommie Taylor
COCO 3 ANIMATOR PROGRAM!	
PYROMANIAC	Richard Goedeken
RACHAEL	
TRAS	Richard P. Trasborg
CC3DEMO.BIN	
ALANDEKOK	Alan DeKok
SCREEN "WASH" UTILITY SET	
OLDGROUCH	Eric A. Wolf

Utilities & Applications:

LOAN AND MORTAGE PAYMENTS	
BACKFIRE	Christopher Johnson

Games:

WORDWRAP	
AJACK	Andrew Jackson

Music & Sound:

KYUM-GAI RAP FOR SOUNDTRAX PLAYE	
SUNDOGSYS	Glen Dahlgren
SOUNDTRAX SCORE PLAYER	
SUNDOGSYS	Glen Dahlgren

Soapbox (chitchat):

SOVIET TRIP REPORT	
MARTYGOODMAN	Marty Goodman

GET 'EM WHILE THEY'RE STILL HOT

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AUG 88	Games	$3.95	❑
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JAN 89	Beginners	$3.95	❑
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JUN 89	Summer Fun	$3.95	❑
JUL 89	Anniversary	$3.95	❑
	VOLUME 9		
AUG 89	Beyond BASIC	$3.95	❑
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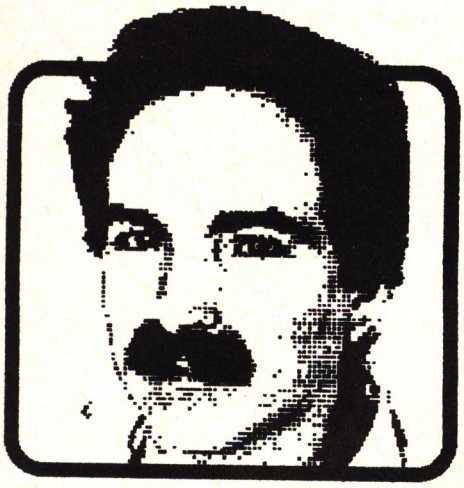
JAN 90	Beginners	$3.95	❑
FEB 90	Home Help	$3.95	❑
MAR 90	Hardware	$3.95	❑
APR 90	Business	$3.95	❑
MAY 90	Printer	$3.95	❑
JUN 90	Summer Fun	$3.95	❑
JUL 89	Anniversary	$3.95	❑
	VOLUME 9		
AUG 90	OS-9	$3.95	❑
SEP 90	Education	$3.95	❑
OCT 90	Graphics	$3.95	❑
NOV 90	Data Comm.	$3.95	❑
DEC 90	Holiday	$3.95	❑



Pyramix

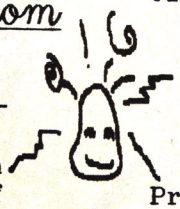
This is a fascinating CoCo 3 game of skill and coordination. Pyramix is 100% machine language written exclusively to take advantage of all the power in your 128K CoCo 3. The Colors are brilliant, the graphics sharp, the action fast. Written by Jordon Tsvetkoff and a product of ColorVenture. **Disk: $19.95**

The Freedom Series

Vocal Freedom

Vocal Freedom turns your computer into a digital voice recorder. The optional Hacker's Pac lets you incorporate voices or sounds that you record into your own BASIC or ML programs. This is not a synthesizer. Sounds are digitized directly into computer memory so that voices or sound effects sound very natural. One "off-the-shelf" application for Vocal Freedom is an automatic message minder. Record a message for your family into memory. Set Vocal Freedom on automatic. When Vocal Freedom "hears" any noise in the room, it plays the prerecorded message directly from its Random Access Memory with amazing fidelity! You may also SAVE or LOAD sounds to and from DISK. VF also tests memory to take advantage of from 64K up to a full 512K. Requires low cost amplifier (RS cat. #277-1008) and any microphone. Will run on a CoCo 1, 2, or 3. Vocal Freedom **Disk: $34.95.** Optional Hacker's Pac **Disk: $19.95. Disk for both: $49.95**

Mental Freedom



Would your friends be impressed if your computer could read their minds? Mental Freedom uses the techniques of Biofeedback to control video game action on the screen. Telekinesis? You control the action with your thoughts and emotions. Your goal is to materialize and levitate objects with the power of your mind while avoiding the insidious cobra. Mental Freedom teaches peace of mind in the face of adversity. Mental Freedom even talks in a perfectly natural voice without using a speech synthesizer! Requires Radio Shack's low cost Biofeedback monitor, Cat. #63-675. Will run on a CoCo 2 or 3 but not CoCo 1. **Disk: $24.95**

Lightning Series

These three utilities give real power to your CoCo 3.

Ramdisk Lightning

This is the best Ramdisk available. It lets you have up to 4 mechanical disk drives and 2 Ram drives on-line and is fully compatible with our Printer Lightning. **Disk: $19.95**

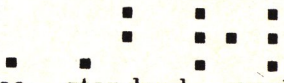
Printer Lightning

Load it and forget it--except for the versatility it gives you. Never wait for your printer again! Printer runs at high speed while you continue to work at the keyboard! **Disk: $19.95**

Backup Lightning

Reads your master disk once and then makes super fast multiple disk backups on all your drives! No need to format blank disks first! Supports 35, 40 or 80 track drives. This utility requires 512K. **Disk: $19.95**

COCO Braille



Produce standard grade 2 Braille on a Brother daisy wheel printer. Easy to use for sighted or blind user. No knowledge of Braille is necessary. Call for free sample. Will run on CoCo 1, 2, or 3. **Disk: $69.95**

VDOS the UnDisk

VDOS, The Undisk, ramdisk for the CoCo 1 or 2 only. Available only on **tape: $24.95**

VDUMP, backup Undisk files to single tape file. Requires VDOS. **Tape: $14.95**

VPRINT, Print Undisk directory. Requires VDOS. **Tape: $9.95**

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CoCo TV

Start your own TV series with a little help from a friend

by Andrew T. Boudreaux, Jr.

Members of my CoCo SIG in New Orleans discussed at a recent meeting various ways of gathering with other CoCo owners in the city. We had already explored several unsuccessful ideas and were perplexed on how to accomplish our objective. Several new ideas, including public service announcements and advertisements on local TV stations, were suggested. My son, Brent, was in production on his own TV show and said we should consider making our own show on the Color Computer. He offered to help us with the project and explained that if ours was an educational program without direct advertising we could get the equipment and studio at no cost through the Community Access Corporation, which is local cable Channel 42. Channel 42 provides facilities and equipment for local community-related programs.

Within two weeks all the necessary forms had been completed and we had a commitment to produce a 13-week series called *Learn Your Color Computer*. The excitement of this new project sparked our members into action. Member Chris Mayeux decided to write the scripts and host the show. Others searched for 3/4-inch commercial tapes, lined up technical assistance, collected special cables and connectors as well as other bits and pieces needed.

Below are several Color Computer programs created by Chris Mayeux for our show that may be of interest to you.

Every TV station requires a one minute header at the beginning of a show. HEADER (Listing 1) creates 30 seconds of color bars, a 20 second slate and a 10 second countdown. Instructions for this are included.

CREDGEN (Listing 2) produces the titles for the beginning of the show as well as the credits at the end of the tape.

TELEPRMT turns a monitor (B/W or color) or TV into a teleprompter so your host can read the script while on camera without having to memorize many pages of written material.

ASCII files (with a .TXT extension) from any word processor can be made compat-

A local cable-TV producer, Andrew Boudreaux, Jr., has used the Color Computer for over three years. He lives in New Orleans with his wife and three children. He can be contacted at 20 Gibb Drive, Chalmette, LA 70043.

ible with TELEPRMT with SCRIPTO. To be most effective, files must be saved in a 32-column format without words being broken apart on the monitor.

WHOSONLN allows for the use of a floor monitor during your show. This allows the host to know who is on hold for up to five phone lines. There is also a single crawl line that can send messages from the control booth to the host while on camera.

This was an enjoyable project for our group. While it was interesting to work in an actual TV studio, we discovered we could have the same results with a quiet room, our CoCo setup and one camera. This enables us to do our show on days when we can't use the studio.

We made our show by shooting part of a studio/host direct shot followed by a section read directly from the computer output. This process was repeated until we had completed a 30 minute show. We found that by continually putting the camera in Pause mode, a three man crew could do this type of filming with positive results. We finished the last three shows in this manner. With a 1/2-inch video camcorder, we shot the show with our own cable adapters and dumped the results to the commercial 3/4-inch tape. When using only one camera, frequent change of camera placement will produce a multi-camera effect. There is time during the computer direct to allow for camera and tripod movement for a new angle.

A general release from Tandy Corporation should be obtained before any TV station or cable company is approached about producing this type of show. Releases for music, talent and software used on the show should also be secured. These releases are recommended for the protection of your group even if they are not requirements of the TV station.

Use the talents within your own group to produce a show. Scripts on various subjects can be written by anyone in your group. You can choose one host or, for more club involvement, a series of rotating hosts for the show. The people who work behind the scenes are very important to the overall success of the show. A project of this magnitude requires a commitment from the entire group to be successful.

We learned several things during the production of our show that might be helpful to you. First of all, keep both text and demonstrations simple. Whatever the subject, make sure your segments are related and can be easily connected in the viewer's mind. Repeat instructions often during a segment. Make sure demonstrations of instructions are exact and cohesive. Break subjects into as many simple sections as time permits. For a smooth show, elect one director who is responsible for the overall quality of the production.

For assistance in the production of your own show, write to the National Federation of Local Cable Programmers, P.O. Box 27290, Washigton, D.C. 20038-7290. If your community does not have cable, contact the local TV station and ask about the possiblity of airing your show.

We of the CoCo SIG in New Orleans hope your group has as much fun as ours with this project, and that the final production is met with positive results. ❑

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NOW AVAILABLE AT YOUR RADIO SHACK STORE PART # 90-2009

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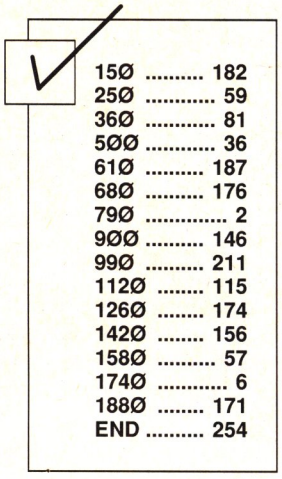
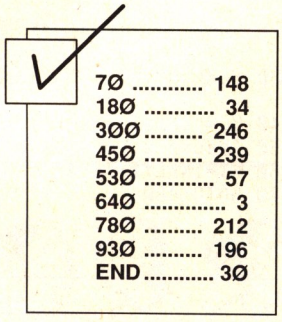


```
150 ..... 182
250 ..... 59
360 ..... 81
500 ..... 36
610 ..... 187
680 ..... 176
790 ..... 2
900 ..... 146
990 ..... 211
1120 ..... 115
1260 ..... 174
1420 ..... 156
1580 ..... 57
1740 ..... 6
1880 ..... 171
END ..... 254
```

Listing 1: HEADER

```
0 'COPYRIGHT 1990 FALSOFT, INC.
10 '***************************
20 'TV HEADER GENERATOR
30 'WRITTEN BY CHRIS MAYEUX
40 '
50 'BE SURE YOU ARE IN 32 COLUMN
60 'VDG MODE BEFORE OPERATING
70 'THIS PROGRAM
80 '
90 '***************************
100 ' WHERE EVER COMMANDS ARE
110 ' CRAMMED TOGETHER, IT IS
120 ' FOR TIMING PURPOSES, DO
130 ' NOT SPREAD THEM OUT !!!
140 '***************************
150 'GENERATE COLORBAR PATTERN
160 '***************************
170 CLS
180 PRINT@0,"30 SECONDS COLOR BA
R LOADED...":PRINT:GOSUB 280:CLS
0
190 CB$=STRING$(4,32)+STRING$(4,
159)+STRING$(4,175)+STRING$(4,19
1)+STRING$(4,207)+STRING$(4,223)
+STRING$(4,239)+STRING$(4,255)
200 PRINT@32,"";:FOR X=1 TO 13:P
RINT CB$;:NEXT X
210 TIMER=0
220 IF TIMER<1800 THEN 220
230 GOSUB 1760
240 GOTO 360
250 '***************************
260 'GIVE DIRECTIONS TO USER
270 '***************************
280 PRINT"STEP 1. SET RECORDER T
O RECORD"
290 PRINT"        AND PUT IT ON
pause"
300 PRINT
310 PRINT"STEP 2. WHEN READY TO
RECORD,"
320 PRINT"        TAKE RECORDER
OFF OF "
330 PRINT"        PAUSE AND PRES
S A KEY."
340 K$=INKEY$:IF K$="" THEN 340
350 RETURN
360 '***************************
370 'ENTER SLATE INFORMATION
380 '***************************
390 CLS
400 PRINT"WE WILL NOW MAKE A SLA
TE SCREEN"
410 PRINT"ENTER THE FOLLOWING IN
FORMATION"
420 PRINT
430 '***************************
440 ' THESE ARE THE DEFAULTS
450 '***************************
460 NM$="SHOW NAME"
470 SN$="0001"
480 PD$="PRODUCER'S NAME"
490 DT$="00/00/00"
500 LN$="30:00"
510 CU$="00:30"
520 '***************************
530 PRINT"25 CHARACTERS MAX"
540 LINEINPUT"SHOW NAME:";K$
550 IF LEN(K$)>25 THEN K$=LEFT$(
K$,25)
560 IF K$=""THEN NM$=NM$ ELSE NM
$=K$
570 LINEINPUT"SHOW NUMBER (####)
:";K$
580 IF LEN(K$)>4 THEN K$=LEFT$(K
$,4)
590 IFK$=""THEN SN$=SN$ ELSE SN$
=K$
600 LINEINPUT"PRODUCER NAME:";K$
610 IFK$="" THEN PD$=PD$ ELSE PD
$=K$
620 LINEINPUT"DATE (##/##/##):";
K$
630 IF MID$(K$,3,1)<>"/" THEN L$
=LEFT$(K$,2)+"/"+RIGHT$(K$,5):K$
=L$
640 IF MID$(K$,6,1)<>"/" THEN L$
=LEFT$(K$,5)+"/"+RIGHT$(K$,2):K$
=L$
650 IF (MID$(K$,3,1)="/" AND MID
$(K$,6,1)="/") THEN DT$=K$:GOTO
670
660 IF K$="" THEN DT$=DT$
670 LINEINPUT"SHOW LENGTH (##:##
):";K$
680 IFK$="" THEN LN$=LN$ ELSE LN
$=K$
690 LINEINPUT "CUE TIME (##:##):
";K$
700 IF K$="" THEN CU$=CU$ ELSE C
U$=K$
710 LINEINPUT"FACILITY NAME:";FC
$
720 IF FC$="" THEN FC$="HERE"
730 CLS:PRINT"20 SECONDS OF SLAT
E IS LOADED.":PRINT:GOSUB 280
740 '***************************
750 'DRAW SLATE SCREEN
760 '***************************
770 CLS(0)
780 PRINT@96,"TITLE:"+CHR$(128)+
NM$;
790 PRINT@135,"SHOW #";SN$;
800 PRINT@192,"PRODUCER:"+CHR$(1
28)+PD$;
810 PRINT@260,"DATE:"+CHR$(128)+
DT$;
820 PRINT@322,"LENGTH:"+CHR$(128
)+LN$+CHR$(128)+"MINUTE(S)";
830 PRINT@389,"CUE:"+CHR$(128)+C
U$+CHR$(128)+"MINUTE(S)";
840 PRINT@448,"FACILITY:"+CHR$(1
28)+FC$;
850 TIMER=0
860 IF TIMER<1200 THEN 860
870 GOSUB 1760
880 '***************************
890 'TEN SECOND COUNT-DOWN
900 '***************************
910 CLS:PCLS:PRINT@238,"wait"
920 N0$="C0D9R1C5R9C0U9L10D16R10
U16"
930 N1$="C5R10L9D16U16L1D9R10L10
D7R10C0U16"
940 N2$="C5D8R1U8L1C0R10D9L10D7R
10U1C5U6R1D6"
950 N3$="C0R11D9L10R10D7L10U1C5U
14L1C5D14"
960 N4$="C5R10L10C0D9R10U9D16L1C
5L9U6R1D6"
970 N5$="C0R10D1C5D8R1U9C0L11D9R
10D7L10U1C5U5R1D5"
980 N6$="C0R10D1C5D8R1U9C0L11D9R
10D7L10U7"
990 N7$="C0R10D16L1C5L9U7R1D7L1U
7R8L9U8"
1000 N8$="C0R10D16L10U7R10L10U9"
1010 N9$="C0R10D9U9L10D9R10D7L10
U1C5U6R1D6"
1020 P1$="BM100,82":P2$="BM116,8
2":P3$="BM136,82":P4$="BM152,82"
1030 PMODE 3,1:SCREEN 1,0:PCLS0:
SCREEN 0,0
1040 CIRCLE(130,90),50,5
1050 PAINT(130,90),3,5
1060 LINE(95,80)-(167,80),PSET
1070 LINE -(167,100),PSET
1080 LINE -(95,100),PSET
1090 LINE -(95,80),PSET
1100 PAINT(96,81),5,4
1110 DRAW"BM170,60C5E5F3G5"
1120 DRAW"BM93,60H5G3F5"
1130 DRAW"BM129,40U5R4D5"
1140 CIRCLE(131,27),15,5
1150 CIRCLE(131,27),12,5
1160 DRAW P1$+N0$:DRAW P3$+N1$
1170 DRAW P2$+N0$:DRAW P4$+N0$
1180 CLS:PRINT@0,"10 SECONDS COU
NTDOWN LOADED...":PRINT:GOSUB 28
0
1190 SCREEN 1,0
1200 DRAW P2$+N0$
1210 T$="10":GOTO 1270
1220 '***************************
1230 TIMER=0
1240 IF TIMER<50 THEN 1240
1250 '***************************
1260 GOSUB 1310:GOSUB 1460
1270 DRAW P3$+NT$:DRAW P4$+NO$
1280 GOSUB 1720
1290 IFT$=" 2"THEN1610
1300 GOTO 1230
1310 '***************************
1320 ' THE TENS PORTION
1330 '***************************
1340 TT$=LEFT$(T$,1)
1350 IFTT$=" "THENNT$=N0$:RETURN
1360 IFTT$="1"THENNT$=N1$:RETURN
1370 IFTT$="2"THENNT$=N2$:RETURN
1380 IFTT$="3"THENNT$=N3$:RETURN
1390 IFTT$="4"THENNT$=N4$:RETURN
1400 IFTT$="5"THENNT$=N5$:RETURN
1410 IFTT$="6"THENNT$=N6$:RETURN
1420 IFTT$="7"THENNT$=N7$:RETURN
1430 IFTT$="8"THENNT$=N8$:RETURN
1440 IFTT$="9"THENNT$=N9$:RETURN
1450 RETURN
1460 '***************************
1470 ' THE ONES PORTION
```

```
1480 '************************
1490 TT$=RIGHT$(T$,1)
1500 IFTT$="0"THENNO$=N0$:RETURN
1510 IFTT$="1"THENNO$=N1$:RETURN
1520 IFTT$="2"THENNO$=N2$:RETURN
1530 IFTT$="3"THENNO$=N3$:RETURN
1540 IFTT$="4"THENNO$=N4$:RETURN
1550 IFTT$="5"THENNO$=N5$:RETURN
1560 IFTT$="6"THENNO$=N6$:RETURN
1570 IFTT$="7"THENNO$=N7$:RETURN
1580 IFTT$="8"THENNO$=N8$:RETURN
1590 IFTT$="9"THENNO$=N9$:RETURN
1600 RETURN
1610 '************************
1620 ' DONE COUNTING NUMBERS
1630 '************************
1640 SCREEN 0,0:CLS 0
1650 TIMER=0
1660 IF TIMER<240 THEN 1660
1670 GOSUB 1760:GOTO 1800
1680 GOTO 1680
1690 '************************
1700 ' DECREMENT DIGIT VALUES
1710 '************************
1720 R=VAL(T$)
1730 R=R-1
1740 R$=STR$(R)
1750 T$=R$:RETURN
1760 PRINT@482,"press"+CHR$(128)
+"pause"+CHR$(128)+"on"+CHR$(128
)+"your"+CHR$(128)+"recorder";
1770 TIMER=0
1780 IF TIMER<600 THEN 1780
1790 RETURN
1800 '************************
1810 'CHOOSE TO RE-DO SOMETHING
1820 '************************
1830 CLS
1840 PRINT " (1) REDO COLORBARS"
1850 PRINT
1860 PRINT " (2) REDO SLATE"
1870 PRINT
1880 PRINT " (3) REDO COUNTDOWN"
1890 PRINT
1900 PRINT " (4) DON'T REDO"
1910 PRINT
1920 PRINT " CHOICE =-->";
1930 K$=INKEY$:IF K$="" THEN 193
0
1940 IF INSTR("1234",K$)=0 THEN
SOUND 200,1:GOTO 1930
1950 PRINT K$
1960 IF K$="4" THEN END
1970 ON VAL(K$) GOTO 170,390,910
```



Listing 2: CREDGEN

```
0 'COPYRIGHT 1990 FALSOFT, INC.
10 'credgen.bas
20 'A CREDITS GENERATOR FOR THE
30 'COCO IN TV ENVIRONMENT.
40 '
50 CLS:PRINT"SETTING UP, PLEASE
WAIT..."
60 CLEAR 11000:DIM CP$(21,15):FL
$="CREDITS.GEN:0":DN=1:FORX=1 TO
 20:FOR Y=1 TO 14:CP$(X,Y)=STRIN
G$(32,32):NEXT Y:NEXT X:VERIFY O
N
70 FOR X=1 TO 20:CP$(X,1)="PAGE
#"+RIGHT$(STR$(X),LEN(STR$(X))-1
):Q=32-LEN(CP$(X,1)):CP$(X,1)=CP
$(X,1)+STRING$(Q;32):NEXT X
80 CLS
90 PRINT@12,"CREDGEN"
100 PRINT@44,"=======":PRINT
110 PRINT"    (1) EDIT SOME CRED
ITS"
120 PRINT"    (2) DISPLAY SOME C
REDITS"
130 PRINT"    (3) QUIT PROGRAM"
140 PRINT"    (4) CHANGE FILESPE
CS"
150 PRINT"    (5) SAVE MEMORY TO
 FILE"
160 PRINT:PRINT"    FILESPEC:";F
L$
170 MU$=INKEY$:IFMU$=""THEN170
180 ON VAL(MU$) GOTO 320,620,990
,210,1010
190 SOUND 200,1:GOTO 80
200 'set filespec
210 CLS:PRINT@0,"FILENAME:######
##";:PRINT@9,"";:LINEINPUT FL$
220 IFFL$=""THENFL$="CREDITS.GEN
:0":DN=1:GOTO 80
230 IFLEN(FL$)>8THENFL$=LEFT$(FL
$,8)
240 FL$=FL$+".GEN"
250 PRINT@0,"FILENAME:";FL$
260 PRINT"dISK OR tAPE ?"
270 DT$=INKEY$:IFDT$=""THEN270
280 IFDT$="D"THENDN=1ELSEDN=-1
290 IFDN=-1THENFL$=LEFT$(FL$,8):
PRINT@0,"FILENAME:";FL$;"    "
300 IFDN=1THEN LINEINPUT"DRIVE:"
;DD$:IF INSTR("0123",DD$)=0 THEN
 PRINT@64,"";:GOTO300:ELSE FL$=F
L$+":"+DD$:PRINT@0,"FILENAME:";F
L$
310 GOTO 80
320 'edit some credits
330 CLS
340 PRINT@0,"(1) LOAD FROM FILE"
350 PRINT@32,"(2) LOAD FROM MEMO
RY"
360 MU$=INKEY$:IFMU$=""THEN360
370 IFINSTR("12",MU$)=0THEN360
380 IFMU$="2"THEN 440
390 OPEN "I",#DN,FL$
400 FOR X=1 TO 20
410 FOR Y=0 TO 14
420 LINEINPUT#DN,CP$(X,Y)
430 NEXT X
440 CLS
450 PRINT@0,"WHICH PAGE ? (1 - 2
0)"
460 LINEINPUT ">";PN$:IFPN$=""TH
```


New Modems

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```
EN 80
470 IF(VAL(PN$)>20 OR VAL(PN$)<1
) THEN 450
480 PN=VAL(PN$)
490 CLS:PRINT@33,CHR$(8);:FORX=1
 TO 14:PRINTLEFT$(CP$(PN,X),31):
NEXT X:FOR TD=1 TO 1000:NEXTTD:C
LS:LINEINPUT"EDIT IT?";ES$:IFES$
="N"THEN 440
500 LINEINPUT"WHICH LINE ? (1 -
14) ";WL$:WL=VAL(WL$)
510 IF(WL<1 OR WL>14) THEN 500
520 CLS
530 PRINT@0,"PAGE:";PN;"  LINE:"
;WL;
540 PRINT@32,STRING$(32,175);:PR
INTCP$(PN,WL);:PRINTSTRING$(32,1
75):PRINT
550 PRINT "SURE YOU WANT TO CHAN
GE IT?"
560 K$=INKEY$:IFK$="" THEN 560
570 IFK$="N"THEN 440
580 PRINT@64,"";:LINEINPUT L$
590 IFLEN(L$)>32THEN L$=LEFT$(L$
,32)
600 IFLEN(L$)<32THEN L$=L$+STRIN
G$(32-LEN(L$),32)
610 CP$(PN,WL)=L$:GOTO 440
620 'display some credits
630 CLS
640 PRINT" (1) LOAD FROM FILE"
650 PRINT" (2) LOAD FROM MEMORY"
660 K$=INKEY$:IFK$=""THEN660
670 IFK$="2" THEN 770
680 OPEN"I",#DN,FL$
690 FOR X=1 TO 20
700 FOR Y=1 TO 14
710 LINEINPUT #DN,CP$(X,Y)
720 NEXT Y
730 NEXT X
740 CLOSE #DN
750 PRINT"CREDITS LOADED...PRESS
 ANY KEY"
760 K$=INKEY$:IFK$=""THEN 760
770 CLS:PRINT@5,"Q-QUIT ANY OTHE
R TO PAUSE";
780 FOR X=5 TO 2 STEP -1
790 PRINT@0,X;:FORTD=1TO370:NEXT
TD
800 NEXT X
810 CLS:FOR TD=1 TO 740:NEXT TD
820 CLS
830 FOR X=1 TO 20
840 PRINT@33,CHR$(8);
850 FOR Y=1 TO 14
860 PRINTCP$(X,Y);
870 NEXT Y
880 FOR TD=1 TO 450
890 K$=INKEY$:IFK$<>"" THEN 960
900 NEXT TD
910 NEXT X
920 POKE 1534,110
930 K$=INKEY$:IF K$="" THEN 930
940 GOTO 80
950 'pause credit screen
960 IF K$="Q" THEN 80
970 K$=INKEY$:IFK$="" THEN 970
980 GOTO 900
990 'terminate process
1000 VERIFY OFF:END
1010 'save memory to file
1020 PRINT@480,"WORKING...";
1030 OPEN "O",#DN,FL$
1040 FOR X=1 TO 20
1050 FOR Y=1 TO 14
1060 PRINT #DN,CP$(X,Y)
1070 NEXT Y
1080 NEXT X
1090 PRINT@480,"FILE SAVED...";
1100 FOR TD=1 TO 1000:NEXT TD
1110 CLOSE #DN:GOTO 80
```

80 30
230 19
320 45
420 208
END 107

Listing 3: TELEPRMT

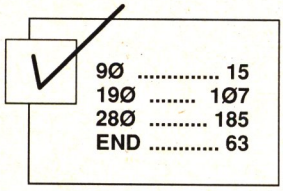
```
0 'COPYRIGHT 1990 FALSOFT, INC.
10 CLEAR 14000:MX=0:DIMS$(300):S
F=26:ST=0:PT=1:RO=PEEK(359):POKE
 359,57:SCREEN 0,1
20 CLS:INPUT"tAPE dISK->";D$:IFD
$="D"THEND=1ELSED=-1
30 PRINT:INPUT"FILENAME";FL$:IFF
L$=""THEN30
40 IFD=-1THENPRINT"REWIND TAPE,
PRESS play":INPUTPR$
50 POKE 359,RO:SCREEN 0,0:GOSUB
350:POKE 359,57:SCREEN 0,1
60 PRINT:PRINT"CMD>";
70 MU$=INKEY$:IFMU$=""THEN70
80 IFMU$="?"THENCLS:PRINT"p PAUS
E":PRINT"n NEXT LINE":PRINT"s ST
ART AND STOP SCROLL":PRINT"b BAC
KUP TEXT A BIT":PRINT"a ADJUST S
PEED":PRINT"q EXIT TO RAT-DOS":P
RINT:INPUT "PRESS enter";PR$:GOT
060
90 IFMU$="S"THENCLS:GOTO140
100 IFMU$="B"THENK$=MU$:GOTO330
110 IFMU$="A"THENK$=MU$:GOTO320
120 IFMU$="Q"THEN POKE 359,RO:EN
D
130 GOTO60
140 GOSUB 480
150 FOR X=ST TO MX
160 FORY=1TOLEN(S$(X))
170 PRINTMID$(S$(X),Y,1);
180 K$=INKEY$:IFK$<>""THEN280
190 FORTD=1TOSF:NEXTTD
200 NEXT Y
210 PRINT
220 NEXT X
230 FOR TD=1 TO 1000:NEXT TD
240 IF EF=1 THEN 270
250 IF RF=1 THEN POKE 359,RO:SCR
EEN 0,0:GOSUB 380:POKE 359,57:SC
REEN 0,1:GOTO 140
260 IF RF=2 THEN POKE 359,RO:SCR
EEN 0,0:GOSUB 440:POKE 359,57:SC
REEN 0,1:GOTO 140
270 PRINT:GOTO 60
280 IFK$="S"THENFORTD=1TO1000:NE
XTTD:GOTO 60
290 IFK$="P"THEN GOSUB 550:GOTO
190
300 IFK$="N"THEN PRINT:GOTO 220
310 IFK$="Q"THENEND
320 IFK$="A"THENPRINT:PRINT"SF="
;SF:INPUT"SPEED";SF:GOTO60
330 IFK$="B"THENPRINT:LINEINPUT"
BACK HOW MANY?>";ST$:ST=X-VAL(ST
$):IF ST<0 THEN ST=0:GOTO 140:EL
SE:GOTO 140
340 GOSUB 480:GOTO190
350 'get first 175 lines
360 OPEN "I",#D,FL$
370 FOR PP=0 TO 174:LINEINPUT#D,
S$(PP):NEXT PP:MX=174:RF=RF+1:RE
TURN
380 'get 2nd 175 lines
390 MX=0
400 IF EOF(D) THEN RF=RF+1:EF=EF
+1:MX=MX-1:RETURN
410 LINEINPUT#D,S$(MX)
420 MX=MX+1:IF MX=175 THEN MX=MX
-1:RF=RF+1:RETURN
430 GOTO 400
440 'get lines until eof
450 MX=0
460 IF EOF(D) THEN:MX=MX-1:CLOSE
#D:RETURN
470 LINEINPUT#D,S$(MX):MX=MX+1:G
OTO 460
480 ' five second countdown
490 SCREEN0,0:FORTD=1TO375:NEXTT
D
500 SCREEN0,1:FORTD=1TO375:NEXTT
D
510 SCREEN0,0:FORTD=1TO375:NEXTT
D
520 SCREEN0,1:FORTD=1TO375:NEXTT
D
530 SCREEN0,0:FORTD=1TO375:NEXTT
D:
540 SCREEN0,1:RETURN
550 'pause scrolling
560 K$=INKEY$:IFK$=""THEN560
570 GOTO 480
```

110 27
230 49
END 247

Listing 4: SCRIPTO

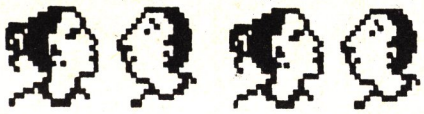
```
0 'COPYRIGHT 1990 FALSOFT, INC.
10 CLS
20 PRINT"SCRIPTO"
30 PRINT"A UTILITY TO MAKE SHORT
 SCRIPT"
40 PRINT"TELEPROMPTER COMPATIBLE
...":PRINT:PRINT
50 PRINT"PROCEED ???":SOUND 200,
1
60 PR$=INKEY$:IFPR$=""THEN60
70 IFPR$="N"THENEND
80 CLEAR 15000:DIM S$(175)
90 PRINT"dISK OR tAPE ???"
100 DT$=INKEY$:IFDT$=""THEN100
110 IFDT$="D"THEN DV=1 ELSE DV=-
1
120 IF(DT$<>"D" AND DT$<>"T")THE
N DV=1
130 IFDV=-1THENLINEINPUT"REWIND
TAPE,PRESS PLAY AND ENTER";PR$
140 LINEINPUT"FILENAME:";FL$
150 IFFL$="" THEN FL$="SCRIPT"
```

```
160 PRINT "LOADING: ";FL$
170 OPEN "I",#DV,FL$
180 FOR CT=0 TO 174
190 IF EOF(DV) THEN 230
200 LINEINPUT#DV,S$(CT)
210 NEXT CT
220 PRINT"FILE IS GOOD...":CLOSE
    #DV:GOTO 320
230 PRINT"FILE IS SHORT...LET'S
    FIX IT":SOUND 200,1
240 IF DV=-1 THEN LINEINPUT"POSI
    TION TAPE,PRESS RECORD";PR$
250 CLOSE#DV:OPEN "O",#DV,FL$
260 FOR X=0 TO 174
270 IF S$(X)=""THENS$(X)=" "
280 PRINT #DV,S$(X)
290 NEXT X
300 CLOSE #DV
310 PRINT"FILE FIXED..."
320 SOUND 200,1
330 END
```



Listing 5: WHOSONLN

```
0 'COPYRIGHT 1990 FALSOFT, INC.
10 CLEAR 5000:PP=PEEK(359):POKE3
59,57:SCREEN 0,1
20 DIM N$(4),M$(4):DF$=STRING$(3
2,42)
30 MS$=STRING$(3,175)+"THIS IS A
N AUTOMATIC MESSAGE...PLEASE CHA
NGE IT"+STRING$(5,175)
40 FORX=0TO4:N$(X)=DF$:M$(X)=DF$
:NEXTX
50 CLS
60 PRINT@0,N$(0);:PRINT@32,M$(0)
70 PRINT@64,STRING$(32,128);
80 PRINT@96,N$(1);:PRINT@128,M$(
1);
90 PRINT@160,STRING$(32,128);
100 PRINT@192,N$(2);:PRINT@224,M
$(2);
110 PRINT@256,STRING$(32,128);
120 PRINT@288,N$(3);:PRINT@320,M
$(3);
130 PRINT@352,STRING$(32,128);
140 PRINT@384,N$(4);:PRINT@416,M
$(4);
150 PRINT@448,STRING$(32,128);
160 POKE1087,49:POKE 1183,50:POK
E 1279,51:POKE 1375,52:POKE 1471
,53:POKE 1535,13
170 FOR X=1 TO LEN(MS$)
180 PRINT@480,MID$(MS$,X,31);
190 FOR D=1 TO 20:K$=INKEY$:IFK$
<>"" THEN 210 ELSE NEXT D:NEXT X
200 GOTO 170
210 'here com the options
220 IF(K$="Q" OR K$="q")THEN POK
E 359,PP:END
230 IF(K$="M" OR K$="m")THENPRIN
T@481,CHR$(8);:LINEINPUT SM$:MS$
=STRING$(33,175)+SM$+CHR$(175):G
OTO 50
240 IFINSTR("12345",K$)>0THENGOS
UB 260
250 GOTO 50
260 NM=VAL(K$)-1
270 IF NM=0 THENPRINT@1,CHR$(8);
:LINEINPUTN$(NM):PRINT@33,CHR$(8
);:LINEINPUT M$(NM)
280 IFNM=1 THENPRINT@97,CHR$(8);
:LINEINPUTN$(NM):PRINT@129,CHR$(
8);:LINEINPUTM$(NM)
290 IFNM=2 THENPRINT@193,CHR$(8)
;:LINEINPUTN$(NM):PRINT@225,CHR$
(8);:LINEINPUTM$(NM)
300 IFNM=3 THENPRINT@289,CHR$(8)
;:LINEINPUTN$(NM):PRINT@321,CHR$
(8);:LINEINPUTM$(NM)
310 IFNM=4THENPRINT@385,CHR$(8);
:LINEINPUTN$(NM):PRINT@417,CHR$(
8);:LINEINPUTM$(NM)
320 IF N$(NM)=""THEN N$(NM)=STRI
NG$(32,42):M$(NM)=N$(NM)
330 IF LEN(N$(NM))>32 THEN N$(NM
)=LEFT$(N$(NM),32)
340 IF LEN(M$(NM))>31 THEN M$(NM
)=LEFT$(M$(NM),31)
350 GOTO 50
```

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GIME Ghostbusters

by Marty Goodman
Contributing Editor

I'm getting a ghost image on my screen. This image is present with both my RGB and composite video monitors. I replaced the GIME chip with a new one from Tandy National Parts and the image problem remains. Any ideas?

Neal Budd (NEALBUDD)
St. Petersburg, Florida

By far the most common cause for a problem like this is a defective GIME chip or one that is making poor contact with its socket. Since you have replaced the GIME chip and reseated the chip in the socket as well, perhaps your problem is more subtle. Some kind of ringing in the memory circuitry? I'd urge you to re-check the seating of that GIME chip and thoroughly inspect the contacts on the GIME chip socket for signs of corrosion.

Neal later responded: *It was the GIME chip that was at fault. And apparently the one sent to me by Fort Worth was also defective. The problem was solved when I tried a third one borrowed from another computer.*

How very unusual. Tandy National Parts seldom sends defective parts. I've been highly impressed with the quality of their service. However, I guess no one is perfect! Glad you solved the problem.

Martin H. Goodman, M.D., a physician trained in anesthesiology, is a longtime electronics tinkerer and outspoken commentator — sort of the Howard Cosell of the CoCo world. On Delphi, Marty is the SIGop of RAINBOW's CoCo SIG and database manager of OS-9 Online. His non-computer passions include running, mountaineering and outdoor photography. Marty lives in San Pablo, California.

GIME Extractions

I've heard you, Marty, recommend use of two jeweler's screwdrivers at diagonally opposite ends of the GIME chip as a means of removing it. I used an alternative solution. I fabricated a GIME chip extractor from an ordinary IC puller. I merely filed down the grabbing part of an ordinary IC puller (of the sort available at Radio Shack and most other electronic supply houses) so that they were 1/8 inch in width and not the 1/4 inch width sported by the stock puller. At this point I could insert the grabbing part of the IC puller at diagnonally opposite corners of the GIME chip and smoothly lift it from its socket.

Robert Capone
Reading, Pennsylvania

Thanks for the tips, guys!

Wide-Screen Modem Pak

How can I make use of 40 or 80 columns on the screen with my Direct Connect Modem Pak? How can I transfer to disk such tape-based games as Pyramid, Raakatu *or* Madness and the Minotaur*?*

Dwane Flint (DEANE)
Leesville, Louisiana

The software in the DC Modem Pak limits it to 32 columns. If you use other software that drives the hardware of the DC Modem Pak (such as *Mikeyterm*, *Delphiterm* and *Vterm*, all of which have provisions for talking to the modem pak) you can operate the Modem Pak and have an 80-column screen. You'll need a Multi-Pak, Slot Pak III or Y cable to connect both the DC Modem Pak and disk controller to the CoCo at the same time. The DC Modem Pak is such an ill-conceived device I strongly recommend you get rid of it and invest in any inexpensive 1200-bps external modem that can be hooked to the 4-pin serial port of your Color Computer and used with *Delphiterm*, *Vterm* and a host of other terminal programs. No Multi-Pak will then be required. You will also get faster, more efficient file transfers.

I don't have any how-to series of steps for putting those classic tape games on disk, but the usual problem with ancient tape-based games is those games load at location $600 in memory. This conflicts with the disk buffer area in a disk-based system. Putting them on disk involves offset loading the games into memory above location $E00 and adding a little assembly language block-move program that, upon execution, block moves the program back down to $600 (or wherever it is normally loaded) and then transfers control to the now properly located program.

Gaining Grounds

Where is a good site to solder a really big ground wire onto the motherboard of the CoCo? I'm putting mine in an AT-type case and want a site to connect the ground wire.

Ted Jaeger (TEDJAEGER)
Fayetteville, North Carolina

The spots where the clips that connected the motherboard to the back of the keyboard used to go are excellent locations.

Lands for *Extended ADOS*

I have two older disk controllers that lacked lands 36 through 39 on their 40-pin edge connectors. This presented a problem when I wanted to use them with Extended ADOS *that requires Pin 37 (the A13 line) to connect its 16K EPROM to the CoCo. Some DB-25 connectors have pins that you individually crimp to wires and plug into blank DB-25 connectors. These pins come joined by a strip of metal. I cut thin strips from this spare metal, bent one end up slightly to facilitate later soldering and bonded them to the controller card using Super Glue in*

one case, and Devcon Plastic Welder in another. After the strips were attached I used a file at the edge to make sure the edge was smooth. Both controllers now work fine with Extended ADOS-3.

D.S. Ricketts (STEVEPDX)
Portland, Oregon

Double Sides for *TW-80*

Several folks have asked me about using TW-80 *with double-sided drives. If you load the configure program for* TW-80 *you will find in it the following:*

```
370 GOSUB 3890:D2=A
380 GOSUB 3890:D3=A
```

Edit those statements to read instead

```
370 GOSUB 3890:D2=&H41
380 GOSUB 3890:D3=&H42
```

and then run the configure program. TW-80 *will now recognize the back sides of drives 0 and 1 as drives 2 and 3. This is the usual arrangement in* ADOS *and most other Disk BASIC enhancements. However, the drives will still be treated as 35- (not 40-) track drives.*

Art Flexser (ARTFLEXSER)
Miami

A very interesting and helpful solution!

Long Printer Lines

How far can I run a parallel printer cable? I've been told that 12 feet is the limit, but I'm in a situation where I really need to run a 25-foot cable.

Ernest N. Dotson, Jr. (ENDOTSON)
Marmet, West Virginia

In most applications parallel printer cables will work fine in lengths up to about 30 feet. Your best bet is to extend such a cable by using a 36-wire male-to-female, 36-pin Amphenol (often incorrectly called Centronics) connector. This assures that all data lines in the extension are separated by grounds. I've heard of people who run parallel cables 50 feet or more without problems, but that is pushing matters and success will vary with the exact circuitry used for the parallel output and input circuits that are joined by such cables. Jameco, of Belmont, California, used to sell a parallel cable conditioner specifically designed to make extra long parallel printer cables work more reliably. I believe it incorporated circuitry to buffer the data lines and/or clean up problems with the data strobe using a Schmitt Trigger circuit. More widely available, albeit more expensive at $150 or so, are pairs of serial-to-parallel/parallel-to-serial converters, that separate your printer from your computer by 100 feet or more by sending the data over a small cable in serial protocol at 19,200 baud or more. This last solution results in slower throughput than a straight parallel cable and could slow things down in graphics-intensive printing situations.

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Disk BASIC/MS-DOS Crossover

Can I use 35-track drives with your program (from the June and July 1986 issues) that provides a means of reading and writing ASCII text files from and to an MS-DOS disk on the Color Computer? In that article you also gave an address for Xenosoft, a company with a product that would read and write alien disks (including Disk BASIC disks) on an MS-DOS machine. I wrote to that address and my letter was returned. Are they still in business?

Charles Gable
Wayne, New Jersey

I'm afraid you must have a 40-track-capable drive to properly read and write MS-DOS disks since MS-DOS has always used all 40 tracks. However, if you are lucky and the file you want to read on the MS-DOS disk is located within the first 35 tracks of the disk, then my program will successfully read and transfer it to CoCo format. Similarly I believe that if you first formatted your single-sided MS-DOS disk on an MS-DOS machine (FORMAT /S) and then used my MS-DOS program to write to it, it will work perfectly well as long as you don't try to cram enough files on it to fill more than the first 35 tracks. My FORMAT program that formats an MS-DOS disk on a CoCo will no doubt fail if used with a 35-track drive.

Xenosoft, I am happy to say, is still in business and moved to newer and bigger quarters a few months after my article was written. There were some serious problems with mail forwarding due to errors made by his local Post Office, the proprietor tells me. Xenosoft has been steadily adding support for more and more alien formats to Xenocopy, which now permits a PC compatible to read and write disks from over 300 different types of alien computers (OS-9 is currently not supported). Their new address is 2210 Sixth St., Berkeley, CA 94710.

Of LaserJets and DeskJets

We've seen HP DeskJet printers advertised for as little as $350 and HP LaserJet printers for under $900. Can either of these be used with the Color Computer? Should one consider getting them instead of a 24-pin dot matrix printer?

Bill Condie (DESKMAN)
Manhattan, New York

David Francis
Austin, Texas

I've heard from several CoCo users who use the HP DeskJet ink-jet printer and are very pleased with it. At $350, one should seriously consider it when compared to the more expensive ($300 and up) 24-pin printers. Note that the DeskJet and laser printers take paper one sheet at a time and may not be suitable for some label and forms printing applications. Additionally, unlike impact printers, they cannot handle multiple-form copies at once. But as prices on these come down, they are becoming attractive alternatives to higher-end, NLQ dot-matrix printers. The DeskJet can (with an optional cartridge) be set up to emulate Epson printers, which makes it instantly compatible with a wide range of software. I also saw the HP LaserJet II driven by the CoCo-based Microworks video digitizer at one RAINBOWfest a long time ago. LaserJet printers require complex escape sequences to select fonts and no CoCo word processor programs are set up to conveniently use all of their power. But you can use a minimum of their features and fonts with most existing programs if you are patient about defining appropriate macros for embedded control characters.

In Search of RFI

Is there a way to disable the TV output of the CoCo 3, thereby reducing RF interference when using a monitor?

James H. DeStafeno
Wyoming, Delaware

You can disable the RF output by either entirely desoldering the RF modulator box or by cutting the power trace that goes to it under the PC board. I do not recommend this. I think if you do this you will discover that the RFI you seek to eliminate is still present. You see, most if not all, of the RFI from the CoCo comes from transmission from the main computer board and not from the RF modulator.

One Cart Short

In attempting to perform the CART interrupt-strapping procedure that you described in one of your articles, I discovered what may be a simpler way to get the same result in the 26-3124 (new style, smaller) Multi-Pak. You can get at Pin 8 of the 40-pin sockets at the low ends of the four pull-up resistors (R3 through R6). Short these together at their low ends and the strapping is accomplished without having to take out the main motherboard or remove the ground-plane sheet.

Jim Harrison
San Diego

That sounds excellent. Thank you for the tip.

Your technical questions are welcomed. Please address them to CoCo Consultations, THE RAINBOW, P.O. Box 385, Prospect, KY 40059.

We reserve the right to publish only questions of general interest and to edit for brevity and clarity. Due to the large volume of mail we receive, we are unable to answer letters individually.

Questions can also be sent to Marty through the Delphi CoCo SIG. From the CoCo SIG> prompt, pick Rainbow Magazine Services. Then at the RAINBOW> prompt, type ASK (for Ask the Experts) to arrive at the EXPERTS> prompt, where you can select the "CoCo Consultations" online form, which has complete instructions.

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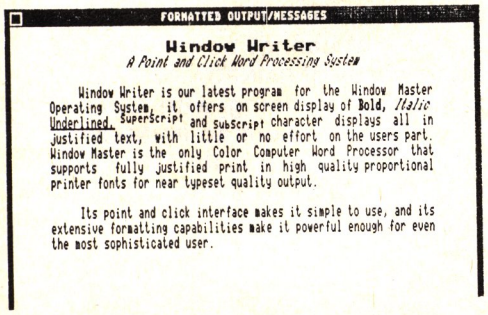
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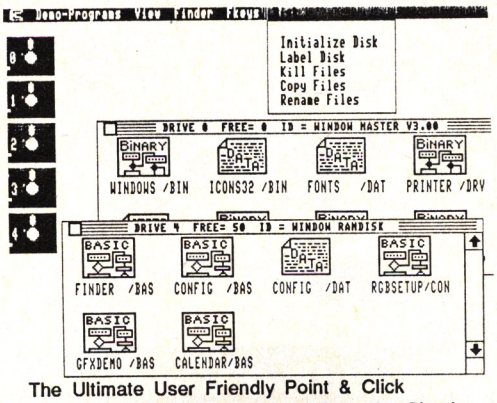

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"..It offers so many features that it is probably underpriced. I recommend this software to all CoCo3 owners." -The Rainbow Feburary 1989

It is completely compatible with existing Basic programs and takes absolutely no memory away from basic. It requires 1 Disk Drive, R.S. hires interface & Joystick or Mouse. Includes 128 & 512K versions for only $69.95.

Window - Ware

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Novices Niche

Angles on the CoCo
by Keiran Kenny

This educational program offers an introduction to trigonometry. I think it is especially useful for those students at the elementary stage of education. With this program a student can enter base angles and actually see the height and base, and the sine, cosine and tangent values vary with each change of angle. This is much more effective than the blackboard scratchings of the Mr. Chalks in my long ago school days.

The triangle has a fixed hypotenuse of length 150. You begin with a prompt to enter an angle from 5 to 85 degrees. With less than 5 or more than 85 degrees, the triangle will not be convincing. You can type an angle with up to 16 digits after the decimal point. The entry routine is in lines 70 through 190. Whatever is entered emerges as a string, V$ and a value, V.

Use the left arrow to backspace and delete errors. Re-type the information and then press ENTER. Line 50 stores a 16-by-16 blank rectangle in the buffer for use as an eraser. The eraser routine is in lines 100 through 140.

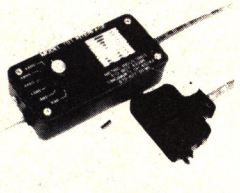
When you press ENTER the triangle appears on the screen with its angles marked A, B and C. Their opposite sides are marked a, b and c. Line 220 draws the triangle and lines 230 through 280 put the letters on the angles and sides.

The sine, cosine and tangent functions of the angle (A) and the lengths of the sides are printed on the screen. Press any key to clear the screen for the next angle.

The program was written for an RGB monitor (Line 30) but it should work on a CMP monitor if you change Line 30 to read PALETTE CMP. Although I am not certain what the color display will be with this change.

The Listing: COCOTRIG

```
0 'COPYRIGHT 1990 FALSOFT, INC.
1 'COCOTRIG' by Keiran Kenny,
  Sydney, 1988.
10 ONBRKGOTO380
20 POKE65497,0
30 PALETTERGB
40 HCOLOR4,8:HSCREEN2:CLS
50 HBUFF1,128:HGET(0,0)-(15,15),
1
60 HPRINT(0,1),"ENTER (A) 5-85 d
egs:"
70 P=21:V$=""
80 K$=INKEY$:IFK$=""THEN80
90 IFK$=CHR$(13)THEN190
100 IFK$=CHR$(8)THEN110ELSE150
110 HPUT(P*8-8,0)-(P*8,15),1,PSE
T
120 P=P-1:IFP<21THENP=21:GOTO80
130 V$=LEFT$(V$,LEN(V$)-1)
140 GOTO80
150 HPRINT(P,1),K$
160 V$=V$+K$
170 P=P+1
180 GOTO80
190 V=VAL(V$):IFV<50RV>85THEN370
200 A=V/57.29577951
210 H=150:X=160:Y=182
220 HLINE(X,Y)-(X+H*COS(A),Y),PS
ET:HLINE-(X+H*COS(A),Y-H*SIN(A))
,PSET:HLINE-(X,Y),PSET
230 HPRINT(19,22),"A"
240 HPRINT(INT((X+8+H*COS(A))/8)
,22),"B"
250 HPRINT(INT((X+H*COS(A))/8),I
NT((Y-6-H*SIN(A))/8)),"C"
260 HPRINT(INT((X+(H*COS(A)/2))/
8),23),"c"
270 HPRINT(INT((X+8+H*COS(A))/8)
,INT((Y-(H*SIN(A)/2))/8)),"a"
280 HPRINT(INT((X+(H*COS(A)/2))/
8),INT((Y-8-(H*SIN(A)/2))/8)),"b
"
290 HPRINT(0,5),"SIN(A) ="+LEFT$
(STR$(SIN(A)),6)
300 HPRINT(0,7),"COS(A) ="+LEFT$
(STR$(COS(A)),6)
310 HPRINT(0,9),"TAN(A) ="+LEFT$
(STR$(TAN(A)),8)
320 HPRINT(0,11),"a ="+LEFT$(STR
$(H*SIN(A)),8)
330 HPRINT(0,13),"b = 150"
340 HPRINT(0,15),"c ="+LEFT$(STR
$(H*COS(A)),8)
350 HPRINT(0,17),"Press any key.
"
360 EXEC44539:K$=INKEY$
370 HCLS8:GOTO60
380 POKE65496,0:CLS:END
```

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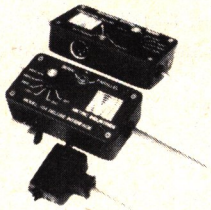

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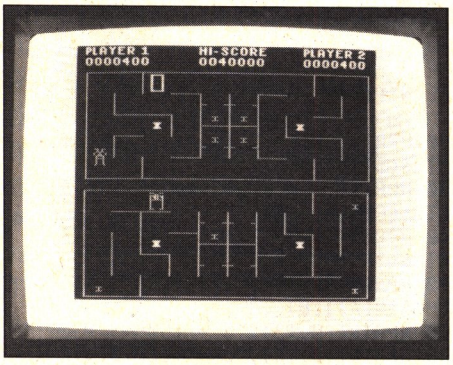
Miscellaneous | CoCo 1, 2 & 3

T&D Software's *Cassette #93*

T&D Software's *Cassette #93* packs a variety of programs for work and play. There are 10 programs altogether; four arcade-type games, three databases, two quizzes and one text adventure.

Of the four arcade-type games, two of them, *Invaders* and *Doctor Who3*, are space invaders shoot'em up games that require a joystick. With *Invaders* you are moving across the bottom of the screen, shooting at and dodging rows of moving blocks firing at you. *Doctor Who3* has you in the air sailing between a moving, shooting laser beam while individual spaceships crash into you.



The third game, *Drop Pack*, is a *Tetris*-type game that requires you to rotate different shaped pieces to fill a wall. The fourth game is *Grabber*. It challenges you to gather boxes from eight corners and place them inside eight rooms without being zapped by other faster moving grabbers who randomly appear to undo your work and to chase you.

The most entertaining game in my opinion is *Grabber*. This is due in part to its cheerful monkey-grinding music that keeps your shoulders bouncing in sync with the little grabber on screen (at least mine did).

The three database programs, *Mr. Movie*, *BabySitter* and *CoCo3 Recipe Machine*, store information for easy recordkeeping. *Mr. Movie* files the specifics for the home-video movie maker who can't remember which tape he put Aunt Sarah's 94th birthday party on. For easy access the program records specifically where on the tape that rare footage is squeezed.

BabySitter keeps a list of clients, their addresses, phone numbers, kids' names (they're numbered for easy memorization) and pay rate. It then adds your total income to date for each individual client. It gives the business of babysitting a professional flair.

The *CoCo3 Recipe Machine* categorizes each recipe and lets you conveniently look for and print copies of recipes for connoisseurs awed by your feats in the kitchen. If you're stingy about sharing your secrets, and feeling a tad bit sly, use the Edit feature to delete one of the recipe's ingredients before printing it. Of course, you may be choosing Uncle Joe's Underground Baked Beans over your best friend.

I suppose if you don't make home movies, babysit or cook in any great capacity, the database programs may not prove to be much of an organizational timesaver. However, the babysitting program is a good way to record your earnings for tax purposes if you have a large amount of this work and an unswerving loyalty to Uncle Sam. All three programs let you print and save to disk. You can save *Mr. Movie* data to tape.

Time for two quizzes. How well-versed are you in Bible scriptures? OK, then identify the following quote: "Pride cometh before a fall." If you can name the book, chapter and verse, you might be able to handle the brutally tough *Bible Scripture* quiz program. It's demanding, but have faith and remember that even if you miss all 53 questions, God is merciful. Just humbly move on to the vocabulary quiz.

Now, how well-versed are you in the English language? Do you consider yourself to be a glib, recapitulating charlatan or a vociferous braggadocio? I hope neither because one's a smooth-talking quack and the other is a loud-mouthed braggart. Just checking. Anyway, you can be either and still take this vocabulary quiz that includes up to 100 questions. *Vocab* is fun if you enjoy learning new words. Its one shortcoming is that there aren't enough questions and after a short while there is nothing new to learn.

Silvercape is *Cassette #93*'s only text adventure. It takes you on a journey to find the lost Lord Silvercape who's been cursed by an evil witch. Most of the adventure takes place inside a castle where death awaits behind uncertain doors. Open one of these and it's back to the drawing board. There are four windows above the text; one for directions, one with graphics showing where you are, one that tells you what items are in the room and one that tells you what items you are carrying. The adventure moves along at a good pace, the riddles and anecdotes are not overly difficult and the graphics window helps you remember your way around, although parts of it you should map along the way. *Silvercape* would be entertaining for hours if it had a Save feature. After going through every passage, curse, guard and dragon, you might suddenly find yourself back in the death chamber, which may cause you to put the game away for a week or so.

T&D Software gives you a lot for your money. Even if you have no use for the database programs, couldn't care less about broadening your vocabulary and feel that Bible-scripture computer drills somehow detract from the intimacy of such a book, the arcade games and text adventure alone are well worth the price. These programs are designed for beginners, and they come with brief, simple instructions.

(T&D Software, 2490 Miles Standish Drive, Holland, MI 49424; 616-399-9648; $8)

— Kelly Goff

Utility | OS-9

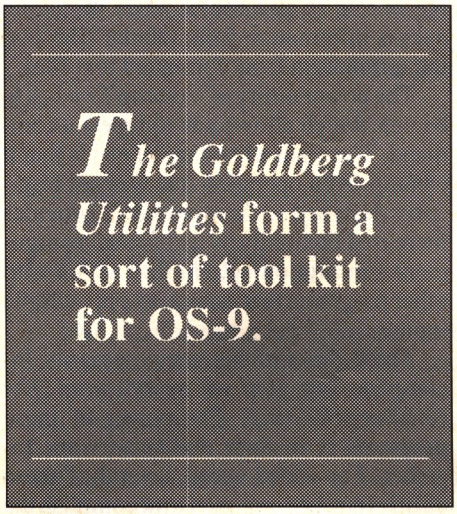
The Goldberg Utilities

As most CoCo users know, OS-9 is a powerful and flexible operating system loosely based on the Unix operating system from Bell Labs. In addition to the obvious differences in hardware, there are also fundamental differences in the way the two operating systems are used. The OS-9 system comes with approximately 30 utilities, many designed to be used as stand-alone programs. An average Unix installation, on the other hand, comes with several hundred small utility programs. Many of these are not especially useful when used alone, but can be combined with other small programs to do very complex tasks.

Since the early days of OS-9 for the CoCo, Stephen Goldberg has been writing small, useful utilities and filters. Some have appeared in THE RAINBOW, usually in Dale Puckett's "KISSable OS-9" column. The best of the Goldberg utilities are now available in two volumes from Kenneth-Leigh Enterprises. Each program is small, fast and well crafted. Individually, only a few of these programs would make the average

OS-9 user take notice. But together, *The Goldberg Utilities* form a sort of tool kit for OS-9. The small programs can be combined using OS-9 pipes to perform some truly amazing feats. Since *The Goldberg Utilities* are available in two volumes, I will treat them separately. But I recommend the purchase of these volumes as a set rather than the purchase of one single volume.

The first volume contains 13 programs. Some are simple in both concept and use. These include `cls` that clears the screen and `val`, a decimal-hex-binary base converter. There are also a couple of programs designed to stand alone and perform useful tasks. The first of these programs are named `pk` and `unpk`. `pk` is used to pack text files to save space, and `unpk` unpacks them when needed. Another program in this group is `unload`, which easily removes modules from memory. Also included is an enhanced version of `copy`. The enhanced version's biggest advantage over the standard version is that it allows for prompted overwriting of existing files with the same name as the one you are copying. It can also use a large buffer to speed the copy process, especially during single-drive copying. Finally there is `append`. This program functions as a combination of the standard OS-9 utilities `build` and `merge`. `append` can create text files, add to the end of text files and combine two text files by adding one to the other.



The rest of the programs can be used alone or with other programs to form new tools. These are some of the most interesting programs in the group. `count` is a small program that counts lines, words and characters. It has options to count any combination of these based on the command line parameters entered. Although `count` can be used to work on groups of files, it is most successful when used on a single file. The same can be said about the programs `head` and `tail`. These programs allow you to look at either the first or last lines of a text file. `head` is especially useful when I need to peek at a file to remind me of its contents. The output of `tail` can vary based on the command line parameters. It can either be the whole file minus the first n lines or just the last n lines. The programs `upper` and `lower` convert files to all upper- or lowercase text. This can be useful for files created all in uppercase like bulletin board files. The `sort` utility is an in-memory sorter that takes its input from the standard input path and sends its output to the standard output path. This makes it most func-

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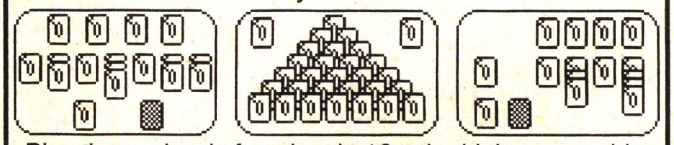

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tional when used as a filter along with other programs.

Another Unix-style utility in volume one is grep. The Unix version is unbelievably powerful, but difficult to use with many of its options. Goldberg's version of grep finds expressions in files. It also has options that allow case-specific matches, and the output can be numbered or totaled several ways. This one will take some time to master, but the results are well worth the effort.

I did not immediately appreciate the program named zcopy since I usually use another utility to do the same thing. This utility copies multiple files from one directory to another. It accepts a list of files to copy as standard input and since the filenames are not changed requires only the name of the destination directory for output. When used in conjunction with d, *zcopy* is an excellent tool for organizing messy directories.

The most useful program of the group is the directory lister, d. Unlike dir, d displays one filename per line and can serve as the first program in a pipe. It can accept wildcards to display certain files. It can also suppress those files. This is more difficult to describe than to use. For example the line d *.ba? produces a list of all files that end in .ba plus one character, such as tempfile.bas and newfile.bak. Adding a - to the filename descriptor causes d to produce a list of all files except these. Used alone d is not a real powerhouse, but when used to supply names to other utilities through pipes it is indispensable.

Volume Two consists of 12 more utilities that are just as useful as those in Volume One. The easiest to use are code and crypt. code prints ASCII codes of input characters and crypt encrypts or decrypts files for security. dsort permanently sorts the filenames in a directory. There is also an improved version of del that accepts filenames as standard input and doesn't abort on an error. Another enhanced version of an OS-9 utility is list, which also accepts filenames as standard input and numbers output. The enhanced version of dump adds options to read files in the execution directory or dumps memory modules. Finally, the version of save is either new or enhanced based on your version of OS-9. Level II does not include a save utility. The Goldberg version has much better error handling capabilities than the Microware version which, in my opinion, makes it a better tool.

New utilities in Volume Two include mv and prep. mv copies a file to a new location and deletes the original. prep splits input into one word per line and converts each to lower case. Also included is comm which compares two files line-by-line and then displays the results in column format. Output format is controlled by command line parameters. The strip utility removes characters from each input line according to command line parameters. It can remove the beginning or the ending of a line as well as all characters after a specified location in the line. It is also useful when removing excess information from tabular files and the left margin from formatted text files.

The power utility of Volume Two has to be rep, which allows you to repeat a command. The main advantage of rep is that it can repeat an operation that was not originally designed to be repeated. It provides increased flexibility by using a clever argument substitution system that works with other programs that cannot accept multiple input.

These descriptions are necessarily incomplete but give an overview of *The Goldberg Utilities*. The power of these programs is in their ability to work together. For added speed several of these utilities can be combined to accomplish the same amount of work in less time. The utilities are relatively small and can be kept in memory, which makes them faster and even more useful. Each volume comes on a single disk and includes adequate instructions with examples for each program. An appendix explains the most effective ways of combining separate programs into memory-efficient groups that can be loaded into memory and linked to make them a permanent part of your system. These packages go a long way in making OS-9 similar in style to the Unix environment and making you more productive. I really enjoyed testing and messing around with *The Goldberg Utilities*. I find them useful, fast, expertly crafted and well-designed. I highly recommend them to anyone using OS-9, Level I or Level II.

(Kenneth-Leigh Enterprises, 1840 Biltmore Street NW, #10, Washington, DC 20009; 202-462-1210; each volume $24.95 plus $2.50 S/H)

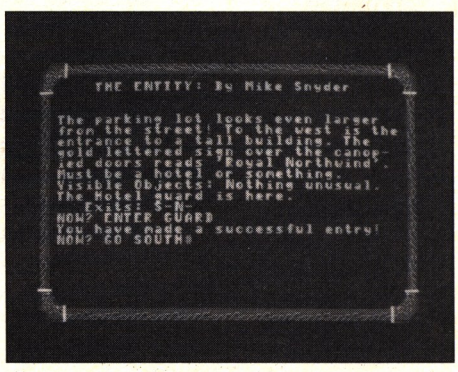
— Don McGarry

Game	CoCo 3

The Entity

The Entity is a new action-adventure game by Mike Snyder that will make you miss the simple days of earlier computer games. As a player, you become a bodiless alien life-form whose purpose is to perform 10 good deeds in a large American city. The number of guesses available at the proper verb/noun combinations is extremely limited and you will have to re-start the game approximately every 20 moves. It is irritating to be unable to perform your assigned deeds. Irritation became frustration and soon I was tapping the CoCo keys with a bit more insistence.

Veteran adventurers will probably overlook the above mentioned irritations and finish the game in just a few hours. Less patient players who like to break and list a game to follow a programmer's logic will have the added irritation of breaking out the disassembler to unscramble this game's machine language.


THE ENTITY: By Mike Snyder
The parking lot looks even larger from the street! To the west is the entrance to a tall building. The gold lettered sign over the canopied doors reads 'Royal Northwind'. Must be a hotel or something.
Visible Objects: Nothing unusual.
The Hotel guard is here.
Exits: S-N-
NOW? ENTER GUARD
You have made a successful entry!
NOW? GO SOUTH

The introductory graphics are nicely displayed and reflect the time and attention given to the aesthetic content of this package. The white-on-black text is easy to read despite a few grammatical and spelling errors. Each screen is loaded separately from the disk drive (a drive is required for *The Entity*.) This slows the game slightly, but response time to player's input is very quick. This may be due to an obviously short verb/noun list.

I strongly recommend the use of a map after your first few experimental adventures. The game counts your moves and records your score. You are awarded 10 points for each successfully completed good deed. Moves must be made very carefully to avoid the ominous Play Again? screen. To display your total points and number of moves used, enter SCORE. Note that this is counted as a move and is probably a waste of your time. STATUS is a command unique to *The Entity*. STATUS describes the body you currently inhabit. However, the use of this command counts against you as a move and should be avoided once all of the different bodies in the game have been memorized. Finding good deeds to perform is less difficult than finding an order in which to accomplish them without reaching the 20 moves-per-game maximum.

EXA (examine) and SEA (search) are useless in the various cells. SPE (speak) is not helpful either. This challenging game can often be quite lonely. But persistence is

rewarded with a nice congratulatory graphics display.

The Entity could be improved in many ways. First of all, the move number and score should be displayed on each input. An updated version of the screen should be shown after each move to reflect the changes made during play. I would eliminate the unnecessary wasting of moves. For example, it should not count as a move to look at a newly created scene. I also suggest the author consult a dictionary to correct the grammatical and spelling errors that exist. I am not an enforcer of proper English etiquette, but mistakes such as these can be very difficult to decipher. It is not always immediately clear whether an unaccepted command is really wrong or simply the result of poor grammar and improper spelling. Even though author error might be a good alibi when explaining a loss, it leads to massive confusion for the gameplayer.

The Entity is a virtually bug-free program from Biware Enterprises. In all the hours my children and I spent muttering over this exasperating little gem, it did not crash. As is characteristic of games that operate on three letter input, I received some strange responses to my commands. For example, OPE might be interpreted as either "operate" or "open." And LEA as "lean" or "leave."

I will not discuss the correlation between the package cost and the satisfaction of playing the game. I will instead leave that up to individual analysis.

(Biware Enterprises, c/o Kandi Stinson, Box 265, Allen, OK 74825, 405-857-9932; $18)

— Mike Shay

Utility CoCo 1, 2 & 3

CIII Lettrex

Many CoCo and other computer users have printers that produce only draft-quality print. There are thousands of printers still being used that have no built-in Near Letter Quality (NLQ) mode. This makes it difficult for computer users to make presentation-quality printouts of text files. Rather than investing in a new printer, CoCo users may now obtain NLQ without the cost. *CIII Lettrex* is a program that reads an ASCII text file from any CoCo word processor and converts the printout to NLQ text in any one of 14 NLQ fonts. There are a few things you will need besides an Epson or Epson-compatible printer. You'll need a CoCo with 64K or more memory, a mouse or joystick, and a disk drive. Two disk drives will speed operation. *CIII Lettrex* can also be of value to users with printers supporting NLQ fonts, such as Star NX-1000, who want more and /or different fonts.

CIII Lettrex is easy to use and well-designed. The program functions as a filter for ASCII text. I tested the program on an NX-1000R printer. It performed well and printed quality text samples in the different fonts. In fact, the fonts were sharper and clearer than the manual portrayed. One thing that Coless Computer Design might consider is higher-quality printing and copying for their own manuals.

When the program begins, you are greeted with an opening screen and three point-and-shoot pull-down menus. Pick a baud for your printer, a font and a pitch. Then load a file and print it. This entire operation takes about as long as reading this paragraph. Once the font and baud have been set, there is no need to re-set them unless it becomes necessary due to the length of time you are in the program.

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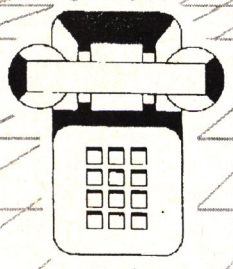

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One feature that I really liked was the demo file. This is a 2½-line file that allows you to see what your text will look like in the font you have chosen. If you like what you see, select Print with the mouse and the font loads and prints. Press E to abort printing, P to pause printing and C to continue printing after a pause. The program automatically senses whether or not your printer is online. If your printer is not online, click on the file box and repeat the procedure from the beginning. Also, there is good error trapping that will give you a big error box displaying an appropriate message and return you to the main screen. So if you forgot to put a disk in, or format it, or left the drive door open, or typed the wrong file name, you can quickly recover. This is a very useful feature.

The documentation that accompanies *CIII Lettrex* is 24 pages long and has 18 figures to assist programming needs. There are also several font tables for font size and estimation of characters-per-line. The only complaint I have is the quality of the print in the manual itself.

If you have a word processor that leaves its control codes visible, your document will not print correctly. You must hide the control codes so they are not visible on the screen. Your files will then print in the prescribed order.

This is a package that is well worth the required investment.

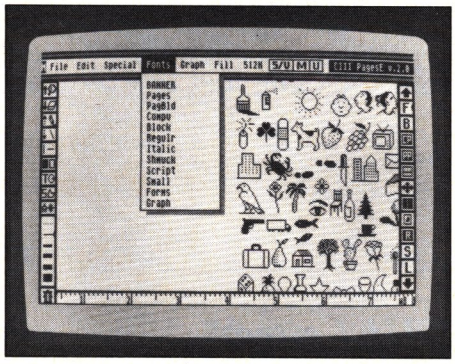
(Coless Computer Design, 1917 Madera St., #8, Waukesha, WI 53186; 414-549-0750; $24.95 plus $3 S/H)

— Jeffrey Parker

Desktop Publishing	CoCo 3

CIII Pages Enhanced Version 2.0

I recently had the pleasure of stacking some pretty exciting CoCo desktop publishing packages against one another in an article for THE RAINBOW (May 1989). If *CIII Pages Enhanced* had been part of that article, it would have received some high marks in certain areas and low marks in other areas. Then in February 1990, Jim Issel, a noted RAINBOW reviewer, looked at the original *CIII Pages*. He was not entirely thrilled by it. Many of his comments about the program produced responses by the program's author, Walter Bayer of Coless Computer Design. Walter took the comments to heart, and in less than six months he had completely rewritten several of the more criticized features of his program for an enhanced version. These enhancements and other improvements to this program are the focus of this review.



CIII Pages is a full-featured desktop publishing package for the CoCo 3. Like its predecessors, *CIII Pages* attempts to put as many different features as possible on the same screen simultaneously. At the same time, it relies on a WIMP (Windows, Icons, Mouse and Pull-down menus) environment to acquaint users with creating and editing. *CIII Pages* operates with either 128K or 512K, though limited to one and three pages of editing respectively. All these tools in one place is good, but even with the required Tandy High Resolution Joystick Interface and a mouse, the left column is so crowded that you can often accidentally click on the wrong icon even if you are pointing at the right one. After a period of adjustment, I could work with these newly enhanced features.

Probably the most important upgrade to the package is its speed and smoothness of operation. With *Version 2.0* the speed is dramatically improved. A hefty rotation or horizontal flip has been reduced from a several-minute wait to one of several seconds. Another enhancement is the requirement that the user choose the appropriate printer baud from within the program. This must be done when the program is first started.

The manual has grown from 68 to 83 pages. The package now contains a separate reference card that is very useful. The text still has grammatical errors and is rigorous in places, but the overall quality has improved. The font, as well as the quality of printing and reproduction make the manual appear "muddy" and unclear. The edges of the letters are poorly defined making the text difficult to read. The manual was printed with *CIII Pages*, but is not an accurate representation of the quality print produced by the program. *CIII Pages* is now distributed on two double-sided, double-density disks. Both sides of each disk must be backed up before the program can be used.

Printer support has remained the same and the Undo function is still limited. If you use the Invert Box feature, the only way to undo it is to exactly match the size with the Invert Box feature. It seems as though there should be a better way to do this. The Text pull-down menu has been replaced with a Graph pull-down for clip-art and picture files. The Text feature is still slow, and if you go too fast, you lose characters.

The user interface takes some getting used to, but is workable. Once an action on a panel has been completed, there is more than one way to get your frame back. The WIMP environment usually negates the necessity of having to read the manual, but with *CIII Pages* you must read the book first.

The program comes with more than 15 fonts, dozens of clip art images as well as enough unique graphics and text-import features to make it a strong contender in the CoCo desktop publishing market. What *CIII Pages* lacks in finesse, it makes up for in muscle and brawn. Jim Issel said the program fills a gap in CoCo DTP. He also said this gap must be filled. I agree with both of his statements. This is an interesting and full-featured product that still needs further streamlining, but it is a good solid value and will get the job done.

CIII Pages is a full-featured desktop publishing package for the CoCo 3. With _Version 2.0_ the speed is dramatically improved.

New to *CIII Pages* is the *CIII Clip Art Set 2* package for *CIII Pages Enhanced Version 2.0*. This is an outstanding value. Although *CIII Pages* is already loaded with clip art, fonts and borders, this set of clip art is excellent in both quality and quantity. There are 672 custom-designed images featured in categories labeled Creatures, Miscellaneous, RAD Concept, Weird, Symbols and D & D Fantasy. This is my only criticism. Each 14-clip file is labeled with one of the above, but they could be broken into

other themes such as Holiday, Religion, Sports, Business, etc. The accompanying manual provides a printout of each clip-art file to find what you are looking for. If you prefer to use the computer, a file viewer called *V* is included with each clip-art disk. I was disappointed with the program at first, but when I loaded the art and printed it on a Star NX-1000 with the standard driver in *CIII Pages*, I was impressed. This is a very good value for clip-art and/or *CIII Pages Enhanced* users.

Clip art requires *CIII Pages Enhanced Version 2.0*. Upgrading from *Version 1.0* costs $12, and you must return your original system disk and sales slip. *CIII Pages Enhanced Version 2.0* requires a 128/512K CoCo 3, a High Resolution Joystick Interface, a mouse or joystick, at least one disk drive and an RGB or composite monitor. This package will not work with TV. A mouse and at least two disk drives are recommended, as is a printer. Make sure your printer is supported.

(Coless Computer Design, 1917 Madera Street #8, Waukesha, WI 53186, 414-549-0750; CIII Pages v2.0, $49.95 plus $3 S/H; CIII Clip Art, $19.95 per set plus $3 S/H)

— Jeffrey Parker

Utility | OS-9 Level II

Planet Engine Version 1.1

Planet Engine Version 1.1 is an OS-9 Level II program with graphics to show the planets, stars and constellations. This program requires a 512K CoCo 3 and OS-9 Level II. *Multi-Vue*, a mouse and a color monitor are optional, but recommended. The high-resolution display mode used by this program makes a monitor desirable.

As *Planet Engine* begins, the screen displays celestial bodies along the ecliptic plane. The ecliptic plane is a band of the sky that includes the section inclined 50 degrees north of the Earth's equator to the section declined 50 degrees south of the equator. The main view shows planets, stars and constellations. A line traces the southern horizon, with the zenith pinpointed by a cross. The relative locations of the various bodies are determined by the time and also your location on Earth. *Planet Engine* displays stars, planets or constellations. Scroll bars can be used to change the time by hours or days.

The program contains three pull-down menus. The first menu provides access to the same features available under the Tandy icon in the *Multi-Vue* menu. The second menu toggles on or off the display of stars, planets and constellations. You can also change the date and time as well as your location on Earth. The time can range from approximately 32,700 B.C. to 32,700 A.D. And your location can, literally, be anywhere on Earth. The planets' orbits can be viewed in an overlay window. With the third menu you can view each planet in an overlay menu. The only drawback of this program is the lack of detail in the pictures of individual planets. These views do not fully exercise the CoCo's graphics capabilities.

Planet Engine is an extremely easy program to learn. I discovered many of the program's features through experimentation before reading the manual. This program can be operated with a mouse, but it also accepts keyboard commands. A 13-page manual that accompanies the program is thorough and well-organized. The manual takes you through backup and installation. It also gives you a sample question, information on the data displayed and instructions on using the various program features. Application ideas are included as well. For example, comparing the posi-

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OS9 LEVEL II BBS RELEASE 3.0

System comes complete and ready to run. Use the built in menus or create your own. Run your own programs or games on-line! Complete message system included. File transfer system supports Xmodem and Ymodem plus automatic validation with keyword searching! Even comes with its own termial program free! Now includes ANSI graphics menus and editor! See board while it runs! For a DEMO call (504)649-5761 (3/12/2400 Baud). Galactic Comflict game also included! 512k OS9 Level II and RS-232 (or COMM-4) pak required $29.95

THE ZAPPER

This wonderful utility allows you to patch anything! Patch commands directly on disk and fix CRCs automatically! Patch the OS9 Boot file! Save lost files! Fix crasehd disks! One use of this program could be worth the price! 64k OS9 Level I or II required $19.95

MULTI - MENU

This great Multi - Vue utility allows you to easily create your own pop-down menus! No programming experience is required, because no programming is done! You will be able to run any OS9 command or program from a menu! Menu creation is super simple, super easy. Actually see the menu as it develops. A must for Multi - Vue users! Makes non Multi - Vue software run under Multi - Vue! 512k OS9 Level II & Multi - Vue Required. $19.95

Alpha Software Technologies

(504) 649-5176(voice) 210 Bluefield Dr., Slidell, LA 70458 (504)649-5761(BBS)

Please add $3.00 Shipping & Handling. COD Order $2.50 Extra

tions of two planets on different dates or viewing the sky from various locations are two suggestions.

The disk includes the program and its graphics files, in addition to icon and application information for *Multi-Vue* users. The program is not copy-protected and can run from any directory or subdirectory on a hard disk. Since the program is fairly disk-intensive, a RAM disk or hard drive will increase the speed of the graphics. *Planet Engine* uses the *Multi-Vue* interface, but can run from the command line in a four color graphics window.

Planet Engine is a well-written program. The first time I used it, I accidentally failed to copy one of the many data files to my hard drive's subdirectory and the program still ran flawlessly. The only thing missing was a small section of the sky. As a test I ran the program a few more times with randomly selected data files missing and had the same results.

Planet Engine contains a wealth of pictorial information. It has helped me in locating constellations during observations of the night sky from my yard. It also allows me to watch the movement of constellations, planets and stars over a period of time. This program would be an asset to teachers in grades 4-12, amateur astronomers or anyone else interested in the cosmos. For its usefulness and extensive data, *Planet Engine* is a bargain at $24.

(Gravity Studio, Box 791, Belton, TX 76513-0791; $24 plus $2 S/H, $5 S/H outside North America)

— Toni Long

Book	CoCo 1, 2 & 3

Connecting the CoCo to the Real World

Would you like to return an inactive, dust-collecting CoCo to exciting everyday use as a weather station? Why not make your CoCo a central control for a complete in-home burglar alarm system? Or perhaps you are not interested in these ideas, but would like to further expand your knowledge on the inner workings of the CoCo and have some fun, too. If any of the above applies to you, then *Connecting the CoCo to the Real World* by William Barden, Jr. may be just the book for you.

For a couple of years now I have enjoyed reading William Barden, Jr.'s column ("Barden's Buffer") in THE RAINBOW, as well as his books on assembly language and graphics for the CoCo. So I was excited about the opportunity to review his latest book, *Connecting the CoCo to the Real World*. I was only slightly disappointed to discover that a few of the projects in the book are simply transplanted from his monthly column. My disappointment was short-lived, though, as I soon learned that there are enough new projects to keep his fans' interest.

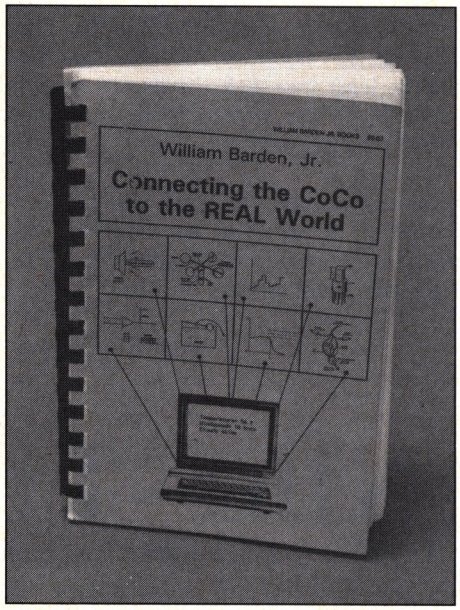
Connecting the CoCo to the Real World is a good book that offers some atypical ideas on how to use the CoCo.

The book and its projects are designed with the novice in mind. Knowledge of digital circuits and programming is not required to build, or use, any of these projects. All you really need to know is how to enter and save a program on your CoCo, as well as how to cut and solder wires. If you want to expand or improve any of these projects, though, you will need an understanding of digital circuits and programming with both assembly language and BASIC. After you've read the book and built some of the projects, it may be beneficial to learn even more about digital circuits and programming.

One chapter is devoted to the work of the CoCo's analog-to-digital circuitry. Other technical information on the inner workings of the CoCo are scattered throughout the book. This information is designed for those who want to learn more about the way in which the projects and the CoCo work in tandem, but it is not necessary to build or operate the projects. Although after building a few projects, your interest and curiosity may increase enough to pursue a deeper understanding of the more technical aspects of these projects.

The cost of the projects vary, but none are outrageously expensive. All of the projects can be built for less than $20 with average costs ranging from less than $5 to slightly more than $10. These costs do not include a proto-board which is needed for several of the more complicated projects. This is an inexpensive item that can be purchased for about $10 from your local Radio Shack.

For those who are familiar with Mr. Barden's column, the book will be easily understood since the projects follow this same style. For those unfamiliar with the Barden style, it can be summed up as the KISS (Keep It Simple Stupid) principle. The instructions are not step-by-step, but they are easy to read and follow. Barden offers suggestions on possible applications and expansions for the completed project. He also encourages exploration of your own ideas.



I had a few problems with the book. First of all I thought it was too short. I also found problems with the first few projects. Not with the projects themselves, but with Mr. Barden's failure to thoroughly explain formulas used to help analyze the readings and find resistances. These formulas are given with little explanation of their origin. While it is possible to build and use these projects without this knowledge, further expansion and changes to the projects without this information could be difficult. It may be necessary to do some reverse engineering to discover the origin of the formulas used.

Connecting the CoCo to the Real World is a good book that offers some atypical ideas on how to use the CoCo. The book is easy to read and the projects are both useful and fun. If you're not careful, there might even be some learning amidst all the fun.

(William Barden, Jr., Box 3568, Mission Viejo, CA 92692, 714-589-8426; $19.95)

— Chris Hyde

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Received and Certified

The following products have recently been received by THE RAINBOW, examined by our magazine staff and issued the Rainbow Seal of Certification, your assurance that we have seen the product and have ascertained that it is what it purports to be.

Math.l, a high-level math functions library for OS-9 and the C compiler. Includes sin, cos, tan, arccos, trunc, pow10, and many other useful math functions. *Bits-N-Bytes, 4140 Victory Drive SW, Port Orchard, WA 98366; $27.42.*

MVDWG 1.0, a program that displays drawing files from the *Multi-Vue* main screen. You can doodle or erase on files or get a fresh re-display all by mouse clicks. Multi-tasking allows `mvdwg` to run as many drawing windows as resources permit. Requires a 512K CoCo 3, OS-9 Level II, and *Multi-Vue*. *Gravity Studios, Box 791, Belton, TX 76513-0791; $7, $2 S/H.*

Data Windows, an OS-9 database that can be run under *Multi-Vue*. *Data Windows* also works without *Multi-Vue*. Full database support includes user-definable fields, multiple-key fields, automatic sorting, fast searching, browsing, user-definable editing, user-definable windows, import/export/merge capability, cut/copy/paste, and report generation and mailing label facilities. Requires 512K and OS-9 Level II. *Alpha Software Technologies, 210 Bluefield Drive, Slidell, LA 70458, (601) 688-3140; $59.95, $3 S/H.*

Delta Pro, a digitizer hardware unit. It uses the Delta format for record and playback. Delta allows high-quality audio recording and playback at low sampling rates. Sampling rates as low as 1K per second still provide good audio quality. Software support programs are included on disk. Full programming instructions are given for development of personalized programs using the pack. This digitizer can digitize a 50-KHz, 5-volt sine wave to 8-bit accuracy. Mic and line level inputs as well as headphone output are included. Requires 64K, disk version 1.1, and Multi-Pak or Y-cable. *Lucas Industries 2000, 14720 Cedar St. N.E., Alliance, OH 44601, (216) 823-4221; $129.95 plus $4 S/H. 10 day free trial offer.*

KJV on Disk #14, II Kings from the King James version of the Bible, in ASCII files for the CoCo 1, 2 or 3. A word processor or text editor is recommended for viewing the files. Requires 32K and disk drive. *BDS Software, P.O. Box 485, Glenview, IL 60025-0485; $3.*

◆ **The Rainbow Indexes**, a two disk package containing databases for ten years of RAINBOW articles, reviews, and RAINBOW ON TAPE/DISK. CoCo 1 & 2 and CoCo 3 versions supplied on disk. Minimum requirement is 32K and disk drive. *Rick Cooper, P.O. Box 276, Liberty, KY 42539; $10.*

CoCo-Cassette #98, a monthly collection of software programs that includes: *Flippy Tutorial* (how to make floppy diskettes out of flippy diskettes), *Recipe/Meal/Grocery* (stores recipes on tape or disk and helps plan meal combinations), *Dungeon Maze* (3-D type Adventure), *Snow Ski* (joystick controlled ski game), *Hot Load* (a TSR program that will run BASIC or Machine Language programs), *Ship War* (graphics game played against the computer), *Error Trap* (allows you to abort, retry or ignore errors), *Space War 3* (two-dimensional outer space battle game for the CoCo 3), *Maze Master 3* (CoCo 3 graphics maze game), *Wizard's Den* (a graphics adventure). *T&D Software, 2490 Miles Standish Drive, Holland, MI 49424, (616) 399-9648; $8.*

512K Copy Utility, designed to make full use of a 512K CoCo 3. This utility will format disks 25% faster than BASIC's `DSKINI` command. Also has simplified `KILL` and `RENAME` commands. Its real power is in copying files. Select files to be copied or use the all files option. If you are using a single-drive system, constant disk swapping is eliminated because 512K of RAM can hold all the files on your disk, even 80 tracks. *Carl England, 128 Shepherd Drive N.E., Calhoun, GA 30701, (404) 629-7197; $15.*

Space Age, an action adventure. You must explore four zones of a space station and destroy Iravo, the master control computer. Written in machine language, *Space Age* will take you through dozens of Hi-Res 16-color rooms. The game includes Pause and Quit features, and a limited continue feature that lets you continue from the point where you were killed. Requires a CoCo 3, a disk drive and a joystick. *Biware Enterprises, C/O Kandi Stinson, P.O. Box 265, Allen, OK 74826; $20.*

Directory Library, gives you the ability to easily organize and manage your library of CoCo disks. The program manages an unlimited number of diskettes and accommodates single, multiple, and double-sided disk systems. Features include add, update, view, print, search, erase, and special name. Search the library of directories for a specific program or data file and be informed of its resident diskette. Use the special name feature to include OS-9 disks to the library. Requires a CoCo 1, 2 or 3 with a disk drive and any compatible printer (optional). *Johnson Software, P.O. Box 92, Dayton, OH 45449, (513) 866-2601; $17.50 plus $2 S/H.*

KJV on Disk #15, I Chronicles from the King James version of the Bible, in ASCII files for the CoCo 1, 2 or 3. A word processor or text editor is recommended for viewing the files. Requires 32K and disk drive. *BDS Software, P.O. Box 485, Glenview, IL 60025-0485; $3.*

Scripteller, is a user-friendly program that enables the user to analyze handwriting and obtain an interpretation of the writer's character and personality. Requires a CoCo 3 and disk drive. A printer is optional. *E.Z. Friendly Software, 118 Corlies Avenue, Poughkeepsie, NY 12601, (914) 485-8150; $26.95 plus $1.50 S/H.*

Picture Disk #1, this disk package contains four picture collections: People, School, Science1, and Science2. Each collection contains 30 pictures. The picture files are *CoCo Graphics Designer*-compatible. Supplied are conversion utilities to generate *CoCo Max*, *CoCo Max II*, *CoCo Max III*, and *Max 10* format compatible disks. *Zebra Systems, Inc., 121 S. Burrowes Street, State College, PA 16801, (814) 237-2652; $14.95 plus $3 S/H.*

DS69VIEW, a viewer for the DS69A/B 16-level, digitized, `.PIX` pictures. Presents choice for viewing files on an RGB or composite monitor. Includes instructions and eight hi-res, 16-level digitized pictures. *Steve Ricketts, 10625 SE 362nd #B32, Boring, OR 97009, (503) 663-7169; $3 S/H. Also available from Delphi in the CoCo 3 Graphics Database.*

◆ **Turbo DOS**, an alternative DOS for the CoCo. Features include customizable palettes and start-up message, a new `WIDTH 64` command, reset protection, modified `DIR` and `DOS` commands, disk labeling program, works with 35- or 40-track, single- and double-sided drives, color burst disabling, key repeat, hotkeys, repeat last command, and more. After customizing your *Turbo DOS* it can be burned into an EPROM or be run out of RAM. *Jeffery Bornes, 3699 N. 175 E. Box 66, Warsaw, IN 46580; $25.*

MINIGOLF!, an 18-hole miniature golf game. You must make par to advance to the next hole. Hill, tube, and blow-bar hazards present an interesting challenge. *J.T. Rawlinson Software, 361 St. Germain Avenue, Toronto, ON M5M 1W6 Canada; $21.95 plus $3 S/H.*

◆ **First product received from this company**

The *Seal of Certification* is open to all manufacturers of products for the Tandy Color Computer, regardless of whether they advertise in THE RAINBOW.

By awarding a *Seal*, the magazine certifies the program does *exist* — that we have examined it and have a sample copy — but this *does not* constitute any guarantee of satisfaction. As soon as possible, these hardware or software items will be forwarded to THE RAINBOW reviewers for evaluation.

Graphics CoCo 3

Rascan 2.4 — *Digitizing a Rainbow of Colors*

There has been a strong interest for several years now in video frame grabbers for the CoCo. Products like The Micro Works DS-69 series have sought to serve this interest, but most of these products have been strictly black and white devices with no color capability. There remains an unfilled demand for a digitizer that actually captures color images. The Rascan digitizer is a product that might just meet this demand. This product, developed in Australia and sold by Supersoft, allows you to capture and display full-color pictures as well as high-quality black-and-white pictures with a CoCo 3. Rascan even allows you to produce images in 3-D.

The Rascan digitizer is a bit different from most other digitizers. It plugs into the CoCo 3's joystick ports instead of the expansion port and can, therefore, be used without a Multi-Pak Interface. The box has a video input (RCA-type phono jack) that works with almost all home video equipment. The unit also has brightness and contrast controls, a power switch, and a second switch to control a filter that is used to keep the color portion of a TV signal from interfering with the process. To set up the digitizer, feed your chosen video source into the input and plug the two cables into the joystick ports. Then put a copy of the driver disk into Drive 0, type "RUN CONFIG" and press ENTER. After setting the monitor type (for an RGB or composite monitor), press F1 to save the settings.

"RUN BOOT" starts the program and produces the Main menu. You must then select the desired mode. Choose 640-by-200 with dithering for 16 levels of gray, 640-by-200 with four actual gray levels, 320-by-200 with 16 colors or the 4096-color mode. The 4096-color mode works only on a 512K system, but the normal black-and-white modes work in either 128K or 512K. To begin the digitizing process, get the video signal ready, select the Capture Image option and switch on the Rascan unit. The menu disappears and a thin bar sweeps from right to left on the display. The next step is to adjust the brightness and contrast controls to get a clear image with good gray tones. Next, use the ALT and CTRL keys to center the picture vertically. The left and right arrow keys center the image horizontally. When the bar disappears at the left of the screen, press BREAK, switch off the Rascan unit and press BREAK again. The image is now in memory and can be saved to disk. Rascan black-and-white image files can be loaded into *Max-10*, *CoCo Max III* or *Color Max 3*. But the 16-color, false-color mode is the preferred method for importing files into the latter two.

The video source can be almost anything that provides a composite video signal, but since the system takes about 15 seconds to scan the image, the image must remain stationary during this period. The best way to take pictures of stationary subjects or artwork is to use a camcorder on a tripod to tape the subject for a few minutes and then play the tape into the Rascan unit later. In some cases you might be able to freeze a frame on the VCR, but this will not work well on most decks so it's advisable not to use still pictures. Laser videodiscs will do just fine if the disc was recorded in the 30-minute CAV mode. Many newer players have a digital memory, which will create still frames from any disc.

A DISK IS A TERRIBLE THING TO WASTE.

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MATH TABLES
ELECTRONICS 9
LOWER TO UPPER
NOIDS

ISSUE #67, JAN. 1988
MEDIA MASTER
SAVE THE EARTH
WEIGHTS & MEASURES
LOW RES GRAPHICS
COAST TO COAST
BACCARAT
BATTLE SHIP
ELECTRONICS 10
TAPE CONVENIENCE
DUEL

ISSUE #68, FEB. 1988
COINFILE
WORD COUNTER
SQUIRREL ADVENTURE
AREA CODES
DRAW POKER
TURTLE RACES
ELECTRONICS 11
MULTI-SCREEN
CANON PRINT
COCO TENNIS

ISSUE #69, MAR. 1988
POLICE CADET
STAMP COLLECTION
BARRACKS ADVENTURE
CITY/TIME
HI-LO/CRAPS
OLYMPICS
HI-RES CHESS
ELECTRONICS 12
DOUBLE EDITOR
DOUBLE BREAKOUT

ISSUE #70, APR. 1988
BLOTTO DICE
SUPER COMM
GENESIS ADVENTURE
PLANETS
PHK/WAR
SIGN LANGUAGE
ARX SHOOTOUT
ELECTRONICS 13
MAGIC KEY
SNAP PRINT

ISSUE #71, MAY 1988
SUPER LOTTO
RODOL ADVENTURE
MAZE
YAHTZEE3
PHASER
SHAPES/PLATES
STAR WARS
ELECTRONICS 14
PRINTER CONTROL
MAZE 2

ISSUE #72, JUNE 1988
MARKET WATCHER
3 STOOGES
HOSTAGE ADVENTURE
PROGRAM TRIO
GLADIATOR
U.S. & CANADA QUIZ
JEOPARDY
ELECTRONICS 15
COCO 3 PRINT
CTTY

ISSUE #73, JULY 1988
FOREIGN OBJECTS
CHESS FUNDAMENTALS
WATERFOWL QUIZ
WHAMMY 3
ADVENTURE TUTORIAL
CIRCLE 3
EDUCATION TRIO
WRITE-UP EDITOR
PICTURE PACKER
AIR ATTACK

ISSUE #74, AUG. 1988
VIDEO CAT 3
1 EYE WILLIE
JAVA
GAME TRIO
CRIONAUT WARRIOR
ENVELOPE PRINT
RAM DRIVE 3
MODE 2
XMODEM TRANSFER
CAVE II

ISSUE #75, SEP. 1988
DRACULA ADVENTURE
HELP TRIO PROGRAM
SHOWDOWN DICE
TARZAR 1 ADVENTURE
ARAKNON
CASH FLOW REPORTING
GRAPHICS LETTER
GRAPHIC EDITOR
ADDRESS BOOK
SQUARES

ISSUE #76, OCT. 1988
SUPER BLITZ 3
CHAMBERS
TRIO RACE
EARTH TROOPER
STARGATE
BOWLING SECRETARY
DISK TUTORIAL
JOYSTICK>KEYBOARD
KEYBOARD<JOYSTICK
* SAILORMAN

ISSUE #77, NOV. 1988
POLICE CADET #2
STARSHIP SHOWDOWN
MUSIC COMPOSER
COUPONS/REBATES
PROGRAM LIBRARY
BOYSCOUT SEMAPHOR
HOUSEHOLD CHORES
MAXOMAR ADVENTURE
CHUCK LUCK3
* BUZZARD BAIT

ISSUE #78, DEC. 1988
POLICE CADET #3
TANK TURRET
WAR OF THE WORLDS
SPINSTER CAFE
COCO-SIZE
SIGN MAKER
LEGAL DEDUCTIONS
BOOK KEEPING
CAR LEASE 3
* WAREHOUS MUTANTS

ISSUE #79, JAN. 1989
POLICE CADET #4
DRAW POKER 3
TILER TEX
BATTLE
INSIDE THE COCO
COCO BULLETIN BOARD
HOT DIRECTORY
VCR TUTORIAL
PRINTER CONTROL
* THE KING

ISSUE #80, FEB. 1989
SCRABBLE
SPELLING CHECKER
SANDSTONE ADVNT.
THE FAMILY FEUD
HARNESS3 HANDICAP
MINIGOLF 3
ULTIMATERM 3
NETWORKING TUTORIAL
A-MAZING PLACE
* MONEYOPOLY

ISSUE #81, MAR. 1989
MONSTERS
SUPER CONCENTRATION
TEN PROGRAMS COCO3
FINANCE
SNOWBALL FIGHT
RULER
POP-UP WINDOWS
TARZAR2 - CASTLE
SUPER LISTER
* DRACONIAN

ISSUE #82, APR. 1989
DUNGEON MAZE
DISK TRANSFER
MAIL MERGE
SUPER SPREADSHEET
BLASTER
TILER TWO
DREAM TUNNEL
DISK UTILITY 3
EDUCATION TRIO
* LUNCH TIME

ISSUE #83, MAY 1989
T&D FIRST 80
MODEM BATTLESHIP
CHURCH MANAGER
SUPER FILE SORT
BASEBALL STATS
TARZAR PT. 3
INVOICE
CARD SQUEEZE
SWORDPLAY 1 + 2
* BREWMASTER

ISSUE #84, JUNE 1989
CROSSWORD PUZZLES
MOUNT DEATH
TERRON
DISK/TAPE TRANSFER
PAPER WORKS
SUPER DATABASE
CONNECT3
BUSINESS MODEL
MASS FORMAT
* CHAMBERS

ISSUE #85, JULY 1989
5 PLAYER POKER
RESUME WRITER
CRAZY CHEMIST
JOURNEY UP
SUBMAINIA
WORKBENCH
VACATION PLANNER
DISK EDITOR II
NIGHT OF THE NINJA
* MARTIAN CRYPT

ISSUE # 86, AUG. 1989
TIME TRAP
PHONE ACCOUNTANT
ON TARGET
NAME THAT TUNE 3
LASER DEFENCE
CHECKBOOK BALANCER 3
KROACH ADVENTURE
SUPER BAR GRAPH
EASY LETTER
* DEVIL ASSAULT

ISSUE #87, SEP. 1989
PURCHASE ORDER
INVENTORY INVOICE
AMERICAN TRIVIA
KROACH2 ADVENTURE
TETRA
SOLO POKER
GALAXY Q3
IBM PICTURE VIEWER
RGB PATCH
* KING TUT

ISSUE #88, OCT. 1989
SALES PROSPECTING
VIRUS 3
WILL MAKER
JOURNAL-GEN. LEDGER
POLICE CADET #5
RED DOG
MAD LIBS
MACINTOSH PICT. SAVER
FROG
* P51 FLIGHT SIMULATOR

ISSUE #89, NOV. 1989
SPEECH INDEXER
QUEST ADVENTURE
EDUCATION TRIOS
BIG LETTER
PANGO
ELEMENTS
GARDEN PLANNER
VIDEO SHOW
WARP
* QUIX

ISSUE #90, DEC. 1989
MUSIC-4 VOICE
HONEYCOMB
POINT OF SALE
ORBS ADVENTURE
IBM - COCO
CIVIL WAR
LIST UTILITIES
BREAK-IN COCO III
LABYRINTH MASTER
* COLOR CAR ACTION

ISSUE #91, JAN 1990
TRENCH FIGHTER
COCVERT3
SPEED GAMES
BUSINESS STARTER
CAVERN QUEST3 PT. 2
BUILDERS HELPER
TARZAR IV
ADDRESS IT
ANIMAL GRAPHICS
* SKYWAY

ISSUE #92, FEB 1990
PENTA-SAME
ROTISSERIE LEAGUE
NICK'S QUEST
SOLITAIR
EDUCATION 4
IBM - BASIC
BASEBALL CARD ORG.
MUNCHY 3
RIVER RAID 3
* CUBER

ISSUE #93, MAR 1990
MR. MOVIE
INVADERS
COCO3 RECIPE MACHINE
SILVERCAPE 3 ADV.
BABY-SITTER'S BASE
BIBLE SCRIPTURE
VOCABULARY QUIZ
DROP PACK
DOCTOR WHO 3
* GRABBER

ISSUE #94, APR. 1990
FLASH CARD
REAL ESTATE LISTINGS
BIBLE QUESTIONS 1
SPELLING QUIZ 1
NO LEFT 3
PICTURE VIEWER 3
TANK SHOWDOWN
TARZAR 5 ADVENTURE
GENESIS
* FOURCUBE

ISSUE #95, MAY 1990
DREAMTIME ADVENTURE
XT/AT SYSTEMS
BIBLE QUIZ 2
16 FLAGS
FRACTIONS
SOLITIARE PUZZLE 4
512K RAM DRIVES 3
FOOD FACTORY 3
WHO PART 2
* TRAP-FALL

ISSUE #96, JUN 1990
ENTREPENEUR
DR. PHRED!
PRINTER FONT CODES
BIBLE QUESTIONS PT. 3
CALO ADVENTURE
FORM MAKER
DRAGON ESCAPE
PLANE EXPLORER
WHO PART 3
* MS. MAZE

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The big feature of the Rascan system is its color and 3-D capability that requires a 512K system and a little maneuvering. The

Rascan unit is purely a black-and-white device and is not equipped to decode composite color signals. To achieve color, the software takes three separate scans of the image (one each for red, green and blue) and drops them into separate RAM buffers. It then displays each in sequence 60 times a second in their respective colors. This is accomplished through a set of color filters that comes with the system to take three separate shots of the subject on tape, one with each filter held in front of the lens. The software allows you to select which buffer to use at any given time and get the images into the right places. When this has been completed, the 4096-color display mode puts the full color image on the screen. The 3-D mode works much the same way except you take two pictures without filters (one for left, the other right) with the camera moved four inches to one side between shots. Then drop the images into the red, green or blue buffers. To view the result, use a pair of red/blue or red/green 3-D glasses, which may have been bought a few years ago to view a special 3-D movie shown on local TV. The yellow/purple glasses used for the 1989 Super Bowl halftime show won't work.

The Rascan system produces high-quality digitized pictures, though good results take some time and practice. Tonal gradation is very good once the brightness and contrast are set up properly, and resolution is acceptable at about 250 lines both horizontally and vertically. (This is somewhat better than the horizontal resolution of a typical home VCR.) A minor flaw is that the area of the image captured is about 83% of the vertical area (200 lines out of a total field of 241) and about 75% of the available horizontal area. This can be moved to any desired portion of the image, but it may be a limiting factor in some cases. As the different ratios would imply, the image is somewhat stretched horizontally and people may appear fat.

The color and 3-D display modes have a problem in that the field-sequential technique used to display two or three buffers at once causes a strong flicker effect. This can be reduced by darkening the room lights and turning the monitor or TV contrast down, but some flicker will still remain and may be somewhat bothersome. The flicker has no effect on still photos of Rascan displays taken from the monitor screen as long as you use a shutter speed of 1/4 second or slower.

Printer drivers are available for Epson-compatible and CGP-220 printers. Reviews of these optional products are forthcoming.

Despite the flicker in the color modes and the somewhat tricky brightness and contrast adjustments, the Rascan system is the best Color Computer digitizer I've ever seen. I have no qualms about recommending it to the serious CoCo 3 user.

(Supersoft, Inc., 363 Oakwood Avenue, Jackson, MI 49203; 517-787-3610; $199.95 plus $6 S/H)

— Ed Ellers

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'tis the C Zen

by Greg Law
Technical Editor

Reading and writing files with BASIC09 should by now no longer be new information to you. Now we will cover the same concepts with the C compiler. Most of the techniques are similar, but there are differences. There are even a few pitfalls thrown in for good measure. In review, we discovered three basic types of I/O operations with BASIC09: interactive, sequential access and direct access.

Interactive access uses the `INPUT` and `PRINT` commands to get data from the user and print it on the screen or printer. I call it interactive since the `INPUT` command allows you to edit your input before you press ENTER. Also, both commands are primarily intended for interactive prompts and queries to the user.

Sequential access uses the `READ` and `WRITE` commands to read and write random-length sequential records that are often stored in memory as a single structure. If you recall our recent discussions, each field and record is terminated by a known character in sequential access files. Keep in mind that these two commands do not readily lend themselves to printing prompts on the screen or printer due to the use of field and record terminator characters.

Direct access uses the `GET` and `PUT` commands to read and write fixed-length records, which are also stored in memory as a single structure. This allows you to quickly locate and retrieve any record within a file by calculating the offset of the record. This is accomplished by multiplying the record number by the size of the record.

In addition to being OS-9 Online SIGop, Greg Law enjoys programming on all types of computers and has worked on systems ranging from the CoCo to the Burroughs B6700 super mainframe. He lives in Louisville, Kentucky.

There are only two basic types of input/output operations in C, buffered and unbuffered. Even though there are only two types of operations, the differences between them can be very confusing to the novice. These two operations can be further divided into dozens of subcategories. These subcategories are grouped into routines for singular data types (character, integer, long and floating point), routines for multiple data types, specialized data conversion routines and miscellaneous routines.

There are only two basic types of input/output operations in C, buffered and unbuffered, and the differences between them can be very confusing to the novice.

The good news is that there are direct counterparts to BASIC09 I/O commands. For simplicity's sake we will first examine these. The differences between Disk BASIC and BASIC09 were covered in the September 1990 issue of THE RAINBOW (Page 28). In the first example, a very simplistic command is given to open a file. The same operation in C is very similar:

```
int path;
path = open("datafile.dat", 1);
```

First, a variable is declared that will be used to hold the returned path number. The `open()` function is called with the name of the file and the access mode as arguments. The access mode specifies the operations that can be performed on the file and is either 1 for reading, 2 for writing, or 3 for reading and writing. Note that `open()` returns the path number as an integer value, much the same as BASIC09. The big difference here is the method used to obtain the returned value. Also, the `open()` returns negative one (-1) if it cannot open the file and, unlike BASIC09, C performs almost no error handling for you. For this reason, the value returned should be tested to determine whether or not an error occurred.

```
int path;
path = open("datafile.dat", 1);
if(path == -1)
     exit(errno);
```

In this case the routine attempts to open the file, then tests `path` to determine whether or not an error occurred. If an error is detected, the program is terminated by calling `exit()` with the value of `errno` as an argument.

Many of the library functions, especially those dealing with I/O, are little more than delegates between you and the operating system itself. For example, `open()` does nothing more than place the address of the filename and the access modes into the registers and performs the `I$Open` system call. The operating system attempts to open the file and returns the results to `open()`. If the file is successfully opened, the path number is returned in one of the registers

Submitting Material To Rainbow

Contributions to THE RAINBOW are welcome from everyone. We like to run a variety of programs that are useful, helpful and fun for other CoCo owners.

WHAT TO WRITE: We are interested in what you want to tell our readers. We accept for consideration anything that is well-written and has a practical application for the Tandy Color Computer. If it interests you, it will probably interest lots of others. However, we vastly prefer articles with accompanying programs that can be entered and run. The more unique the idea, the more the appeal. We have a continuing need for short articles with short listings. These are especially appealing to our many beginners.

FORMAT: Program submissions must be on tape or disk, and it is best to make several saves, at least one of them in ASCII format. We're sorry, but we do not have time to key in programs and debug our typing errors. All programs should be supported by some editorial commentary explaining how the program works. We also prefer that editorial copy be included in ASCII format on the tape or disk, using any of the word processors currently available for the Color Computer. Also, please include a double-spaced printout of your editorial material and program listing. Do not send text in all capital letters; use upper- and lowercase.

COMPENSATION: We do pay for submissions, based on a number of criteria. Those wishing remuneration should *so state* when making submissions.

For the benefit of those wanting more detailed information on making submissions, please send a self-addressed, stamped envelope (SASE) to: Submission Guidelines, THE RAINBOW, The Falsoft Building, P.O. Box 385, Prospect, KY 40059. We will send you comprehensive guidelines.

Please do not submit material currently submitted to another publication.

and `open()` returns this path number to you. If an error occurs, the carry flag in the condition codes register is set and an error code is placed into one of the registers. In this case, `open()` stores the error code in `errno` and returns -1.

You probably think the process of opening a file and checking it for an error condition is long and drawn out. One of the prime advantages of C is the ease with which such tasks can be shortened. In the above code `path` is assigned the value returned from `open()` and compared against -1. Shortening the logic a little, we basically have the following form:

```
a = b;
if(a == -1)
```

Do you remember the basic laws of algebra? Given an equation, the value for a given variable can be determined through mathematics:

$$2x + y = 12 + x + y$$
$$2x - x + y = 12 + y$$
$$2x - x = 12$$
$$x = 12$$

Let's apply this formula to our code. In the following section, *a* and *b* are used to represent an arbitrary variable or function.

```
a = b; if(a == -1)
(a = b); if(a == -1)
if((a = b) == -1)
```

By now you must think I've gone stark raving mad. If you do not understand the connection between the laws of mathematics and the process I used to derive the short-hand notation, follow along closely as the technique unfolds. Given the assignment statement *a=b*, isn't *(a=b)* the same? The parenthetical enclosure of the assignment statement has no effect so it must be the same. And isn't *(a=b)* the same as *a*? It is since *a* and *b* are both the same. Then the results must be equal. The parentheses are added to the assignment statement so that the assignment operation is performed prior to the comparison. Whew! Checking our work, the original statement is:

```
path = open("datafile.dat", 1);
if(path == -1)
```

Since `path` is assigned the value returned from `open()`, we can assume these are equivalent. Therefore, the following must also be true:

```
if(open("datafile.dat", 1) == -1)
```

The only difference is that `path` is completely dropped from the formula, which makes the results useless. In other words, the file may be opened but it isn't helpful since we tossed the path number into the bit bucket. With this logic in mind, we should be able to finalize the statement as:

```
if(path=open("datafile.dat",1)==-1)
```

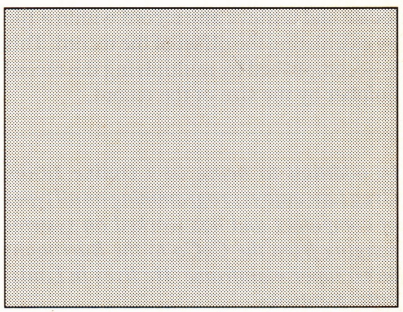
Although this looks correct and may indeed be mathematically correct, it is logically incorrect. The reason is a four-letter word known among C programmers as *precedence*. This one curse word renders the above statement useless. Because the comparison operator (==) is higher on the precedence chart than the assignment operator (=), the above statement is the same as:

```
temp = open("datafile.dat", 1);
path = (temp == -1)
```

That is, if `temp` is assigned a value of -1, the comparison is True (1). Otherwise the comparison is False (0). A bizarre side effect causes `path` to be assigned a value of True or False based on the results of the comparison. Because of the rules of precedence, we must enclose the assignment operation within parentheses to force the compiler to perform the operations in the desired order. Our final result is

```
if((path=open("datafile.dat",1))==-1)
   exit(errno);
```

Now you know why precedence is often referred to as a four-letter word. I urge you to locate a book with the precedence chart in it. Copy that page, cut it down to size and paste it on a wall or monitor within easy reach. And it may help to remember my motto, "*If in doubt, add parentheses!*" Remember, it is better to be safe than sorry. Stay tuned next month for the continuation of our discussion of file I/O. By then we should have a few examples to better illustrate these concepts.



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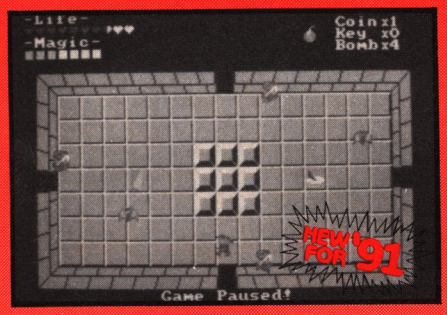

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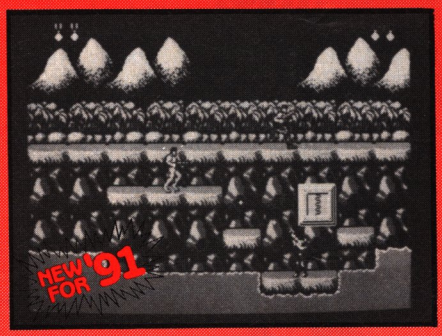

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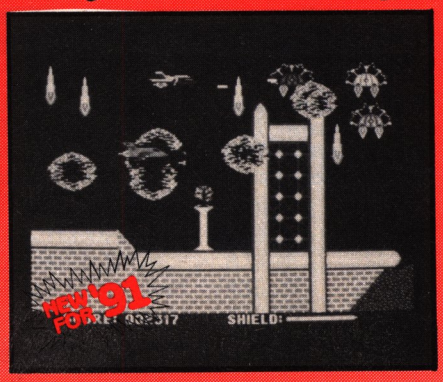

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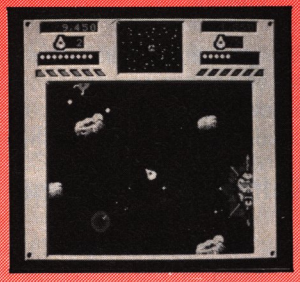

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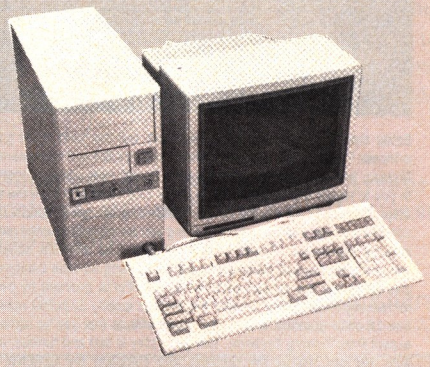

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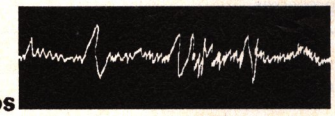

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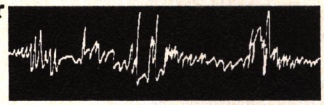

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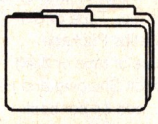

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We're glad we could be of service, and thanks for the kind words.

Printers and Hard Drives

Editor:

What kind of serial-to-parallel printer interface would I need to connect my DMP-133 printer to my CoCo 3? I am interested in purchasing one and do not know that much about the parallel interfaces. I understand that there are different sizes, but I would like to know what size to get. I am also interested in purchasing a hard drive for my CoCo 3 and I don't know how to purchase one. What do I need to have one and what comes with it? I understand it cuts down on having to use software all the time. I would like to know how one is used and what programs can be put on it. My CoCo 3 has 128K, but I have been thinking about going to 512K. I would like to know whether or not it would be worth the money.

Dwaine Acker
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Canada

Microcom and Metric Industries, both advertisers, offer serial-to-parallel converters. Perhaps other vendors do, too. The "size" you mention must refer to an optional buffer. That is up to you. For information about hard drive systems for the CoCo, see "A Hard Drive for Your CoCo" (March 1989, Page 44).

THE RAINBOW welcomes letters to the editor. Mail should be addressed to: Letters to Rainbow, The Falsoft Building, P.O. Box 385, Prospect, KY 40059. Letters should include the writer's full name and address. Letters may be edited for purposes of clarity or to conserve space.

Letters to the editor may also be sent to us through our Delphi CoCo SIG. From the CoCo SIG> prompt, type RAI to take you into the Rainbow Magazine Services area of the SIG. At the RAINBOW> prompt, type LET to reach the LETTERS> prompt and then select Letters for Publication. Be sure to include your complete name and address.

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Burke & Burke	23	Howard Medical	98	Rainbow on Tape and Disk	72
Carl England	47	Hyper-Tech Software	49	Rick Cooper	31
Cer Comp	71	Interactive Media Systems	16	Rulaford Research	77
CoCo Pro	29	JWT Enterprises	79	Russ Griggs	69
Coless Computer Design	49	Metric Industries	73	SD Enterprises	75
Color Systems	69	Microcom Software	7	Second City Software	33
Colorware	IBC	Microcom Software	9	Soft and Friendly	53
Computer Plus	IFC	Microcom Software	13	Sub-Etha Software	42
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Frank Hogg Laboratories	91	PCM Magazine	43	True Data Products	45
Game Gem Games	37	P & M Products	37	Zebra Systems	97
Gimmesoft	93	Rainbow Back Issues	60		
Granite Computer Systems	65	Rainbow Binders	51		

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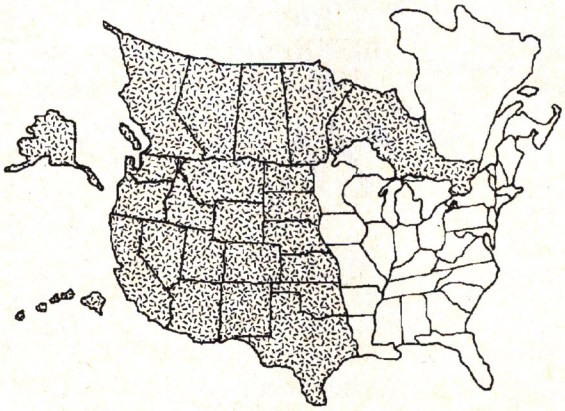

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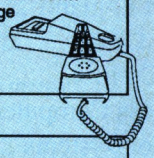

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GR4 - 22 Coco Max Pictures
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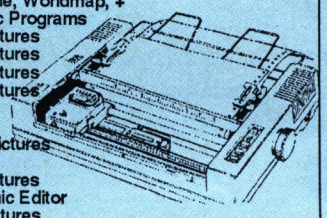

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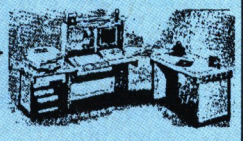

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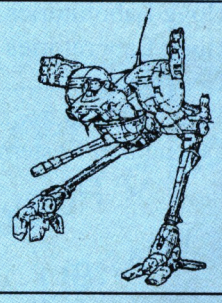

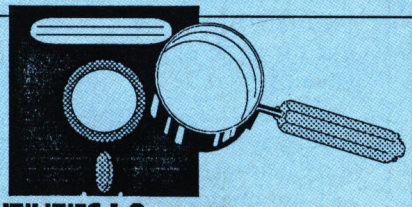

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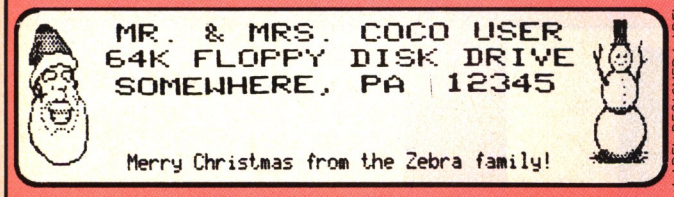
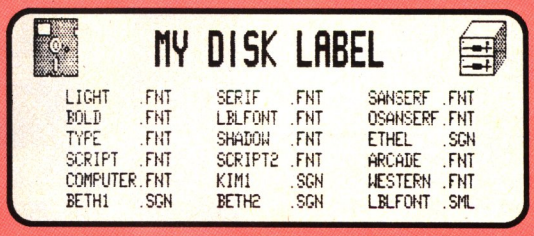
- **Zebra Systems' Graphics User Interface:** Pull down menus, scrolling-window file selectors, dialog boxes, radio Buttons, the works!
- **Standard Features:** Click and drag picture placement, up to 4 pictures per label, 3 different picture sizes, powerful text editing with variety of type fonts and sizes, prints 1-999 copies, templates for standard & large address, file folder, disk, and cassette label sizes.



LABEL DESIGNER LABEL
PRINTED ON DMP105

- **Mail Merge Option** merges name and address or other text file data for printout onto your custom label templates with graphics and other text. Great for club mailings, Christmas card lists, membership name tags, etc.



LABEL DESIGNER LABEL
PRINTED ON DMP105
80% OF ACTUAL SIZE

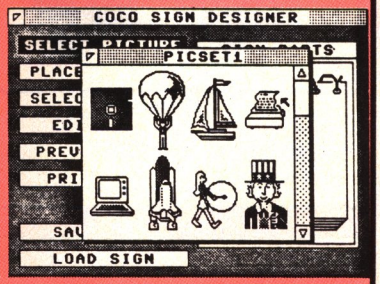
- **Disk Directory Option** pastes the names of your disk files onto the label text editor screen for inclusion on your labels.
- **Serial Numbering Option** for making sequentially numbered admission tickets, product numbering, inventory labels, etc.
- **Hardware Requirements:**

CoCo II 64K, or CoCo 3, disk drive, mouse or joystick, compatible printer

- **Includes** disk, laser typeset user's manual and sample quantities of different size labels. Price: **$34.95**

We stock white and colored labels in a variety of address, disk, and cassette sizes at competitive prices.

Banners, Signs & Greeting Cards



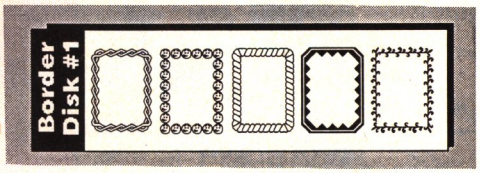
Picture Selection Screen

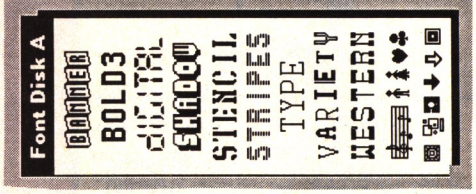
The CoCo Graphics Designer Plus, produces beautiful greeting cards, banners, and signs for holidays, birthdays and other occasions.

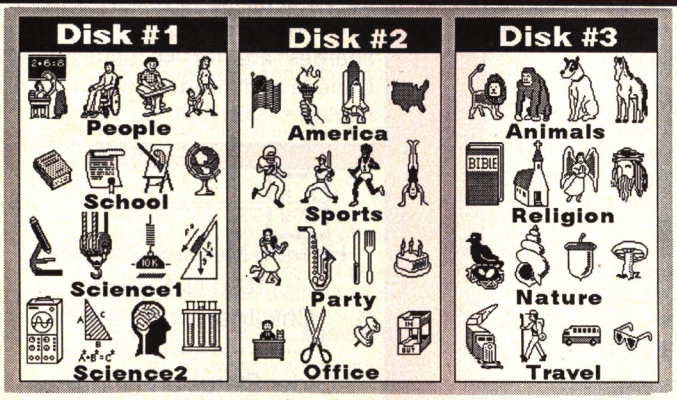
The CGDP features an easy-to-use point and click graphical interface with windows, scroll bars, radio buttons, and joystick or mouse control. Text can be used in up to 4 sizes and 16 fonts per page. Picture, Font, and Border collections are included. Signs and cards can be previewed on screen.

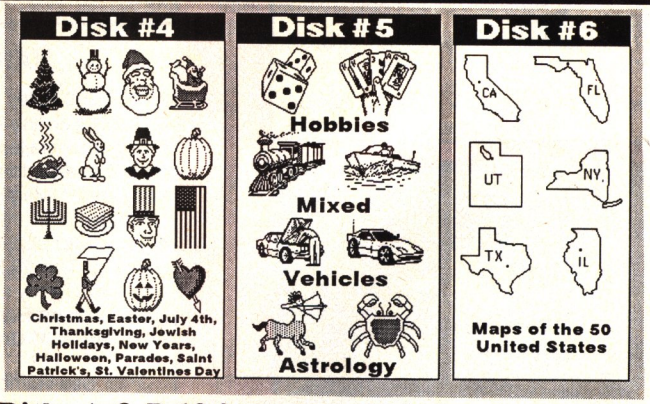
Read the review in May 89 Rainbow.
CGDP Disk & 64 page typset manual. **$29.95**

Requirements: CoCo II 64K or CoCo III, disk drive, RSDOS, joystick or mouse. Printers supported include: Epson RX/FX/LX, Gemini 10X, SG10, NX10, NX1000, DMP105/106/110/120/130/132/200/400, Panasonic KXP1080 / 90 /91/92, Prowriter, C.Itoh 8510, Okidata 92/93/182/183 & more.





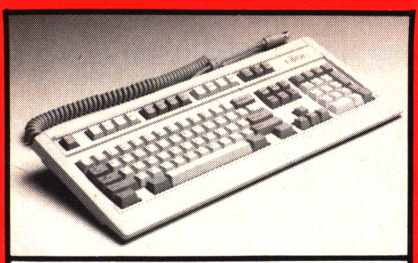




Optional Disks for LD & CGDP $14.95 each: Font Disks A & B 10 fonts ea. • PD's 1 to 4 have 120 pictures each • PD #5 60 double-width pictures • Border Disk 176 Borders for CGDP only, not LD.

Ordering Instructrions: All orders add $3.00 Shipping & Handling, UPS COD add $3.50 extra.
VISA/MC Accepted. PA residents please add 6% sales tax. Hours 9-12 & 1-5 EST Monday to Friday.

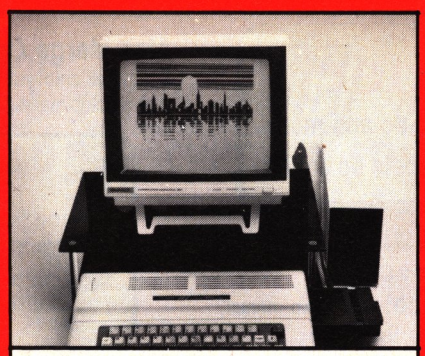
Zebra Systems, Inc. 121 S. Burrowes Street • State College, PA 16801 • (814) 237-2652



KEYBOARD

- 101 Keys with tactile touch
- Coiled cable with RF filter
- can be used with CoCo, Tandy or IBM and auto senses XT or AT

KB-1	Keyboard	$98.00
KB-A	CoCo Adaptor	$89.50
KB-1A	Keyboard & Adapt.	$149.00



MAGNAVOX 7622 AMBER OR 7652 GREEN

- 80 Column
- Built in Speaker

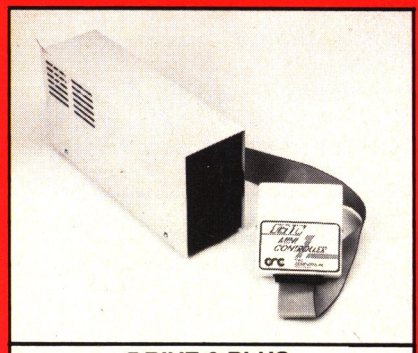
$98 (7 ship)

DISTO BOX

DC-7	Mini Controller	$ 75.00
DC-3	Super Controller	$ 98.00
DC-6	No Halt Controller	$129.00
MBA-1	3 in 1 Board	$ 69.45
MEB	Mini Expansion Bus	$ 30.00
RS232	RS-232 Port	$ 49.95
DC-3C	Clock and Parallel Port	$ 40.00

PRINTERS

STARNX-1000R	COLOR	$249.00
STARNX-1000II		$189.00
VA-1	Video Converter for CoCo 1&2	$29.45
HR-2	Dual Hi-res adapter	$39.45



DRIVE 0 PLUS

- Double sided 360K MPI 52
- Disto DC-7 controller and cable **$178.45**
- Double Drive 0+ **$289.00**
  Drive 0 + Drive 1 (TEAC)

MEMORY

• 512K Bare Board	**$40**
• Populated 512K & Software	**$89**
• 1 MEG Bare Board	**$160***
• Populated 1 MEG	**$200***

*requires 512K upgrade

FLOPPY DRIVES

52	MPI 5¼ Full Height 40 track Double Sided 360K	$75.00
55B	TEAC 5¼ Half Height 40 track Double Sided 360K	$98
235	TEAC 3½ Half Height 80 track Double Sided 720K	$89
FR-35	Frame Fits 3½ into 5¼ space	$12
502-C	Power Cable for 502	$12

SLOT-PACK III by Chris Hawks

- replacement for multipack
- 3 slots, 2 switchable, new hard switch
- X slot for RS-232 for modem (specify)
- middle slot can take disk controller or ROM cartridge
- 12 Volt adaptor required so power is not drawn from CoCo

MP III	slot pack III	$89.45
AC-12	12volt adaptor	$14.95

HARD DRIVE

20,000,000 Bytes or the equivalent to 125 R.S. 501's on line are packed into this hard drive, pre installed and ready to run. This complete easy to use package includes a Seagate 20 Meg Hard Drive, a DTC 5150 Controller and interface, * a heavy duty case, power supply and fan and a 1 year warranty. This 20 Meg Hard Drive will also work with Tandy and IBM clones.

RSB Access Basic thru OS-9 $39.45
FILE REPACK Un-Fragments disc $29.45

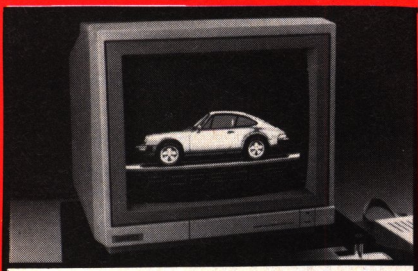
See Rainbow Reviews 8/89

HD-1	**10 Meg****	**$349**
HD-2	**20 Meg**	**$499**
HD-3	**30 Meg**	**$549**
HD-4	**40 Meg**	**$598**
HD-8	**80 Meg**	**$1,090**

*Burke & Burke **reconditioned

30 Day Money Back Guarantee

Howard Medical's 30-day guarantee is meant to eliminate the uncertainty of dealing with a company through the mail. Once you receive our hardware, try it out; test it for compatability. If you're not happy with it for any reason, return it in 30 days and we'll give your your money back (less shipping.) Shipping charges are for 48 states. APO, Canada and Puerto Rico orders are higher.



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CoCo Max III

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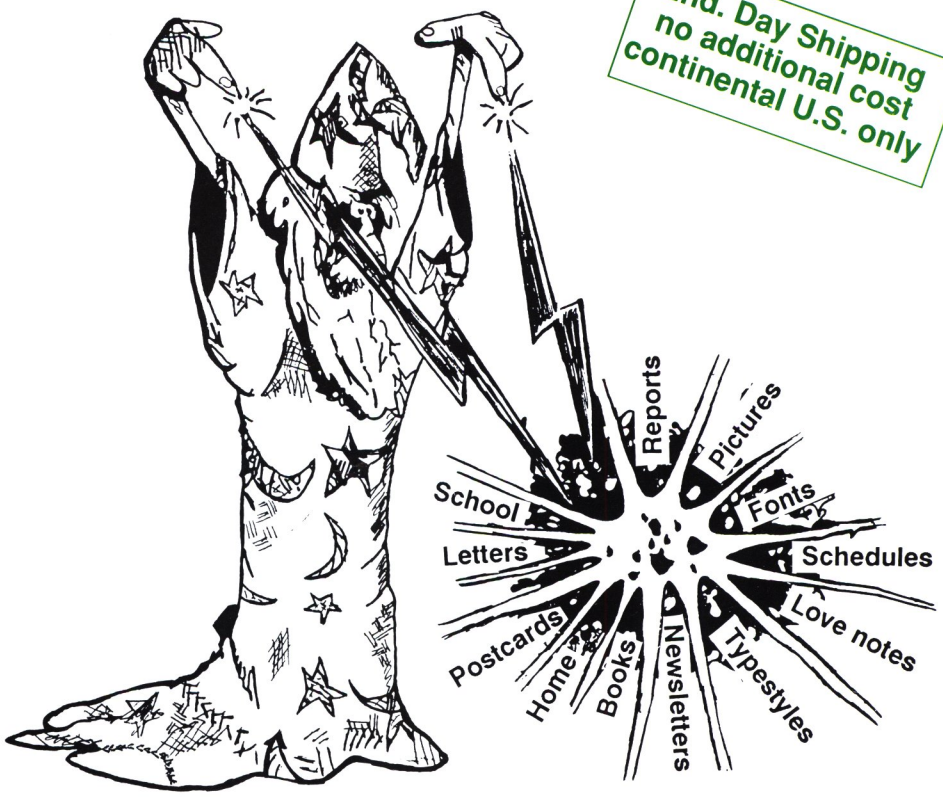
Save $100

BOTH

CoCo Max III and **Max-10** for

~~$149.90~~ now only: $49.95

2nd. Day Shipping no additional cost continental U.S. only



Christmas Bonus: THE WORKS for an amazing $79.95

The Works is: CoCo Max III + Max-10 plus ALL the additional fonts at a super low price

About Max-10

What the CoCo Community needs is a word processor that's rock solid, blindingly fast, feels like a Macintosh, makes all the others look boring, and does not cost $80.
Max-10 is just that and more. It allows on screen mixing of graphics and text, large headlines, multiple columns and full page preview (with graphics).
We swear that Max-10 will add excitement to your word processing, and that's no small task!
PRINTERS SUPPORTED: EPSON FX,MX,RX,LX AND COMPATIBLES; DMP 105,106,130; CGP220 (B&W); OKI 182,92,192; STAR NX-10, NX-1000.

Max-10 Add-ons

- **Max-10 Fonts**. 36 super fonts on 2 disks. Send for list. Order #C-23 ....~~$29.95~~ **$14.95**
NOTE: Max-10 and CoCo Max Fonts aren't interchangable.
- **Spell Checker** 35,000 word dictionary for online spell checking and dictionary lookup. Perfect seamless integration with Max-10. Order #C-24.....~~$29.95~~ **$14.95**

System Requirements

Max-10 and CoCo Max III Require: any CoCo 3; 1 or more disk drives; joystick or mouse; Radio Shack Hi Resolution joystick interface; a video or RGB monitor or a TV.

About CoCo Max III

Whether you doodle for fun or design graphics for a living, **CoCo Max** will amaze you. It's simply that good!
Its major features include: Huge picture area (2 full hi-res 320x192 screens). Large editing window. **Zoom** mode for detail work. 28 point and click drawing tools. Shrink and stretch. **Rotation** at any angle (1.5° steps). 512K memory support (all features work with 128K too). Undo (Oops) feature to fix mistakes. **Animation**. Special effects. Color sequencing (8 colors, variable speed). 13 fonts (more available). Each font has 8 sizes and 5 styles for thousands of possible combinations. Translate program to convert most types of pictures. **CoCo Show** "slide show" program. Miniload program to help use pictures with your software. Color editing of patterns. Prints in single or double size. Select 16 of 64 available colors, all 64 colors are shown at once for easy selection. Pull-down menus. **40 paint brush** shapes. Two color lettering. Spray can. Amazing "flowbrush". RGB and composite monitor support. Colors print in 5 shades of gray.
PRINTERS SUPPORTED: EPSON RX,FX,MX,LX AND COMPATIBLES; STAR/GEMINI NX-10,NX-1000; DMP100,105,106,110,120,130,200; OKI 82A,182,192; CGP-220(B&W)
Color Drivers available. See next column.

CoCo Max III Add-ons

- **Max Fonts** disks. 95 fonts on 4 disks. For those thousand words your picture equals. Now only .....~~$49.95~~ **$29.95**
Or two sets of two disks each .....~~$29.95~~ **$14.95**
- **Max Edit** Don't like our fonts? Make your own or edit existing ones. Creativity literally from scratch. Don't pass this offer up! .....~~$29.95~~ **$14.95**
- **Color Printer** drivers NX-1000 Rainbow, CGP-220 and Okimate 20. Bring your pictures to life with the magic of color. For CoCo Max III only .....~~$29.95~~ **$14.95**

Happy Holidays from all of us at Colorware

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Ordering Information: We accept Visa, Mastercard, Checks and M.O. C.O.D. is $4 extra Purchase orders are subject to credit approval. Connecticut residents add 8% sales tax. Shipping: $4 per order (usually UPS ground). UPS 2nd Day Air: $4 extra. Next Day service available. Canada: $6 per order (Airmail). Outside U.S. & Canada: Add 10% of order total.

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